



# Natural Resources Management on Corps of Engineers Water Resources Development Projects: Practices, Challenges, and Perspectives on the Future

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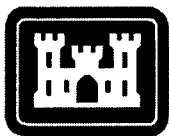
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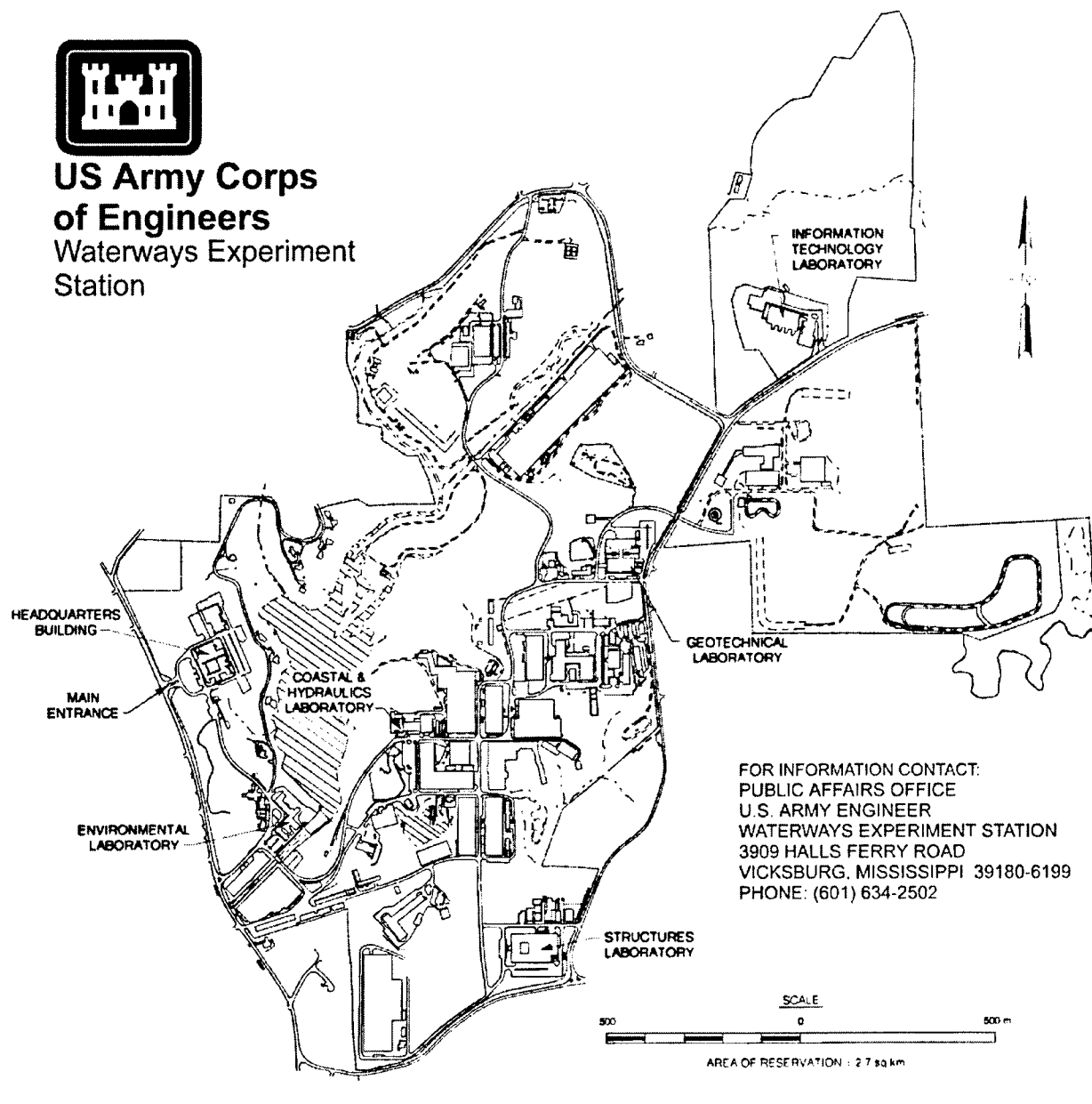
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# Preface

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The report herein was prepared as part of the Recreation Research Program (RRP), Work Unit 32891, titled "Assessment of Natural Resources Managed by the Corps of Engineers." This work was conducted by the U.S. Army Engineer Waterways Experiment Station (WES), for the Headquarters, U.S. Army Corps of Engineers (HQUSACE). HQUSACE Program Monitors were Ms. Judith Rice (CECW-ON), Mr. Ron Conner (CECW-PD), and Mr. Bill Erwin (presently CENWS-CO-SP).

Technical oversight and guidance were provided by Mr. E. Paul Pelouquin (CENPD-ET-ON), Field Review Group proponent for this work unit, and by a project steering committee appointed by Ms. Rice. The steering committee was chaired by Mr. Roy Proffitt (CESPK-CO) with members Messrs. Phil Benge (CENWW-OP-RM), David Brady (CESAS-OP-R), Jude Harrington (CENAB-OPF-R), and Don Wiese (CESWF-OD-M).

The survey instrument used to collect the data reported herein was developed with assistance from Mr. Pelouquin and the steering committee. It was reviewed and tested by the natural resources management staffs from the Lake Sonoma (California) and Granada Lake (Mississippi) projects. A database of survey responses was developed and managed by Dr. Daniel S. Allen, Louisiana State University, Baton Rouge. Portions of the survey analysis were conducted by Mr. Darrell Evans, Stewardship Branch, Natural Resources Division, Environmental Laboratory (EL), WES.

This report was prepared by Messrs. Richard L. Kasul, Resources Analysis Branch, Natural Resources Division; Chester O. Martin, Stewardship Branch, Natural Resources Division; and R. Scott Jackson, Resources Analysis Branch. It was prepared under the direct supervision of Dr. H. Roger Hamilton, Chief, Resources Analysis Branch; and the general supervision of Dr. David J. Tazik, Chief, Natural Resources Division; and Dr. John H. Harrison, Director, EL. Program Manager of the RRP during the initial stage of report preparation was Mr. Russell K. Tillman, EL. He was succeeded as Program Manager by Dr. Tazik as the report neared completion.

At the time of publication, Dr. Robert W. Whalin was Director of WES; COL Robin R. Cababa, EN, was Commander.

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# 1 Introduction

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The U.S. Army Corps of Engineers has constructed over 460 water resource development projects in 42 states. These reservoir and river projects provide important public services such as flood control, navigation, hydroelectric power, and water supply. The characteristics of these projects are highly diverse, ranging from large multipurpose reservoirs averaging over 120,000 ha (300,000 acres) on the Missouri River, to small reservoirs averaging less than 2,000 ha (5,000 acres) in the northeastern United States (Hart 1981). Many of these projects support navigation on major river systems such as the Mississippi, Ohio, and Columbia Rivers.

## Management Authorities

In recent years the Corps has shifted emphasis from water resource development to water resource management (Clarke and McCool 1996). One aspect of the Corps water resource mission is the management of natural resources associated with Corps projects. This mission was first set forth in the Flood Control Act of 1944 (P.L. 78-534) (U.S. Congress 1944). This act first recognized the value of natural resources, authorized the Corps to engage in stewardship of natural resources associated with Corps projects, and gave the Chief of Engineers broad discretion in fulfilling stewardship responsibilities.

Subsequent legislation provided authority for the Corps to address various aspects of natural resource management. The Forest Cover Act (P.L. 86-717) (U.S. Congress 1960) and subsequent agency interpretation require the Corps to engage in stewardship and management of forests and other vegetated lands for the purposes of forest, fish, and wildlife conservation. The Federal Water Project Recreation Act (P.L. 89-72) (U.S. Congress 1965) provided the Corps with the authority to engage in fish and wildlife enhancement while requiring cost-sharing with non-Federal partners to execute such programs. Recreation, fish, and wildlife were made project purposes by this act. Other legislation such as the Endangered Species Act (P.L. 93-205) (U.S. Congress 1973) and the Fish and Wildlife Coordination Act (P.L. 85-624) (U.S. Congress 1958) directs the Corps to undertake measures to protect threatened and endangered species and mitigate adverse environmental effects of Corps projects. Collectively, this legislation provides the Corps with a mandate and broad authority to provide natural resource management programs.

Natural resources management on Corps water resources development projects is also guided by authorities contained in authorizing legislation for each project. This legislation identifies approved purposes of each project that the Corps has been directed to construct and operate. A project is typically authorized for multiple purposes such as flood control, navigation, water supply, hydroelectric power, recreation, and fish and wildlife.

Implementation of statutory authorities for natural resources management on each Corps project is guided by a project master plan and an operational management plan. The project master plan identifies management objectives and general approaches for meeting those objectives. The operational management plan contains more detailed management prescriptions for meeting objectives set forth in the master plan. The project master plan and operational management plan are subject to approval by higher authority, and once approved, often provide long-term guidance for natural resources management activities on Corps projects.

## **Significance of Corps Natural Resources**

Corps projects contain almost 3.3 million hectares (8 million fee acres) of land and water resources that serve as the base for natural resource management activities. Two factors are particularly significant in affecting the scope and nature of Corps natural resource management activities. First, land resources on Corps projects usually comprise a riparian border around Corps reservoir and navigation projects (Hamilton and Reinert 1997). This land, including diverse wetlands on many projects, constitutes an environmentally significant resource supporting many important wildlife species (Harrington 1991). The configuration of Corps lands is substantially different from that of land resources managed by other Federal agencies such as the U.S. Forest Service and U.S. Bureau of Land Management, whose holdings usually comprise large blocks of land that can support a larger scale of natural resource management activities.

A second factor influencing the significance of natural resources is the proximity of Corps projects to urban areas. Eighty percent of Corps projects are located within 80 km (50 miles) of a metropolitan area. Many are natural resource islands in rapidly urbanizing landscapes. Habitat loss due to land use intensification has been identified as the single most important factor in species endangerment (Flather, Joyce, and Bloomgarden 1994). Fragmentation of plant, animal, and fish habitat caused by changes in land use patterns means that public lands are the last refuge for many vanishing species (U.S. Forest Service 1994). The proximity of Corps projects to population centers also results in intensive recreational demands. The Corps administers only about 2 percent of the Federal land available for outdoor recreation yet attracts over 30 percent of all recreation use that occurs on Federal lands (U.S. Department of the Interior 1992). Recreation use of Corps-managed natural resources makes an important contribution to the trend identified by Frederick and Sedjo (1991) that recreation has replaced commercial production of food and fur as the principal use of wildlife.



## **Emerging Management Concepts**

Two decades ago the Nature Conservancy (1975) reported rapid losses in ecosystems and species communities throughout the United States. This finding and other corroborating studies have resulted in agencies placing greater emphasis on understanding the impacts of human activities and the benefits of ecosystem level management (U.S. Forest Service 1994). The ecosystem management approach can be directed toward a variety of goals including the conservation of a single species (Hutto, Reel, and Landres 1987), the conservation of ecologically related groups of species such as waterfowl (U.S. Fish and Wildlife Service 1986), or the conservation of ecosystem characteristics such as aquatic biodiversity (Frissell and Bayles 1996). Salwasser, Schonewald-Cox, and Baker (1987) identify the importance of interagency cooperation in implementing ecosystem management programs. Martin et al. (1996) suggest that an ecosystem approach provides a means of managing for a variety of resources simultaneously and enables more efficient and effective conservation of biological diversity.

The Corps has initiated several formal efforts to understand the ecosystem-level impacts of its water resource management programs. The Upper Mississippi River System Environmental Management Program is probably the largest example of ecosystem management associated with Corps projects (U.S. Army Engineer District, Rock Island, 1997). Environmental aspects of water management plans on the Missouri and Columbia Rivers and the Everglades also address these issues at the ecosystem level. However, considerable technical and institutional challenges exist to effective ecosystem management by Federal agencies (Walters 1997).

Within the scope of statutory authority, Corps managers have considerable discretion in deciding the nature of natural resource management programs and the degree to which they apply emerging principles of ecosystem management and biological diversity. The riparian character of Corps water resource projects, their proximity to population centers, and rapidly changing regional land use patterns create both opportunities and challenges for Corps natural resource managers. The goal of this study was to understand how Corps project managers are responding to these issues in the formulation and execution of natural resource management programs.

## **Purpose and Scope of Study**

Much of the Corps natural resource management program is formulated and implemented by local natural resource managers at Corps projects. This study attempts to characterize this portion of the Corps program as the sum of the individual project efforts. The study is based on a detailed survey of natural resource management efforts administered to a sample of Corps projects. Objectives of the study are to characterize Corps natural resource management goals and objectives, identify the types of resources most often targeted for management, characterize the management

methods most often used to achieve management goals and objectives, identify agency and informational resources available to support natural resource management, and identify current and emerging issues and impediments to the management of Corps natural resources.

## 2 Methods

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### Sample Selection

Natural resource management on Corps water resource development projects was documented using a lengthy and detailed questionnaire mailed to a random sample of projects. A sampling frame for the survey was developed from a list of the 463 operational Corps water resource projects identified in the Corps of Engineer Natural Resource Management System (NRMS) Database (Headquarters, U.S. Army Corps of Engineers, 1996a). In developing the sampling frame, 38 of 44 projects with fewer than 40 fee hectares (100 acres) were removed from potential consideration because they appeared to have negligible natural resource assets. Most were damsites for which project acreage appeared to support mainly engineering assets. Then, 95 individual projects were combined into 21 groups. Each group contained from 2 to 11 projects managed from a single natural resource management office. The final list contained 348 projects or groups of projects identified with a single responsible management office (Appendix A).

Each of the 349 projects or groups of projects was placed into one of 10 strata corresponding to Corps divisions as they existed prior to 1997. A random sample of 6 or 9 projects was then drawn from each of the 10 strata, yielding a planned sample size of 66 projects in all (Table 1). In 8 of the 10 divisions, six projects were selected at random and without replacement from projects within the division. In each of the two remaining Divisions, Ohio River (ORD) and Southwest (SWD), nine sample projects were selected by the same method. The planned allocation sampled from 11-33 percent of projects in the different divisions. Nineteen percent of projects in the sampling frame were sampled overall. The geographic distribution of projects in the sample is shown in Figure 1.

Projects selected for the sample ranged in size from about 70 to 62,000 ha (170 to 153,000 acres) with an average size of about 10,120 ha (25,000 acres). The size distribution of sample projects closely followed the size distribution of all Corps projects (Figure 2).

In the random selection of projects within divisions, projects from 24 Corps districts plus the New England Division appeared in the sample. Of five districts that did not appear in the sample, none had more than three projects within their geographic boundaries and three had only one. Districts present in the sample tended to be represented approximately in

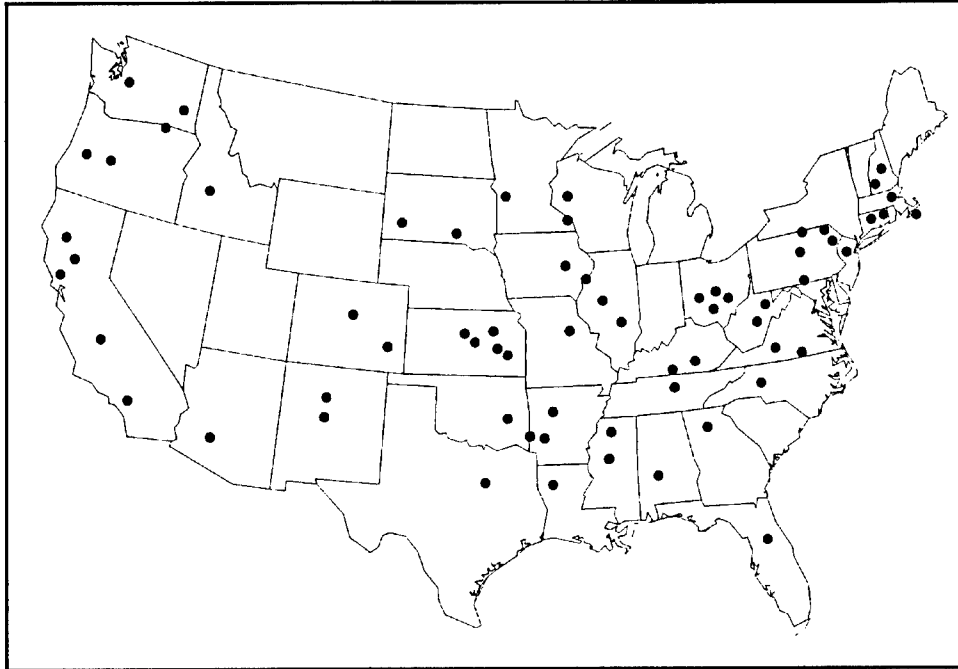


Figure 1. Geographic distribution of Corps projects selected to participate in the natural resources management survey

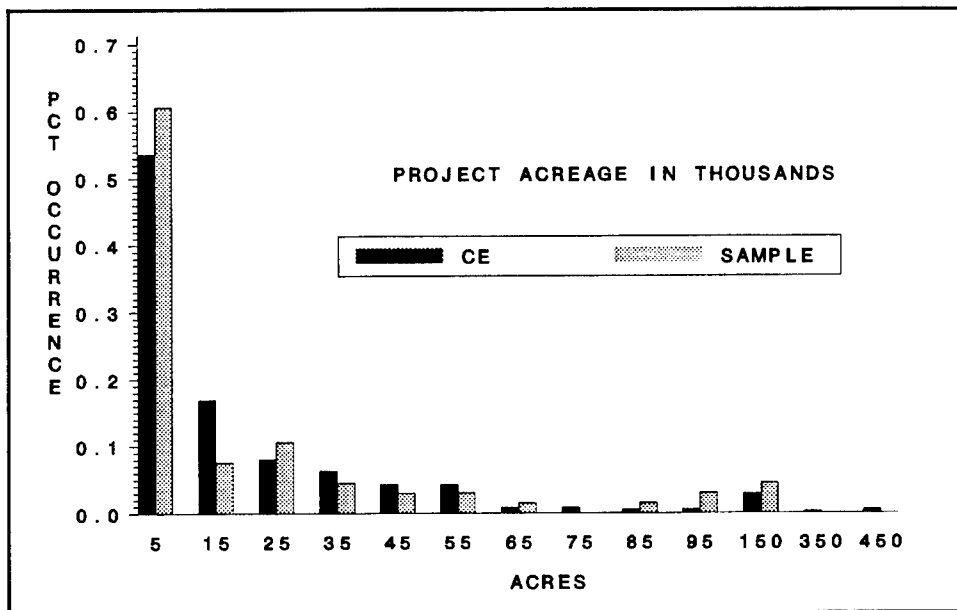


Figure 2. Size distributions of all Corps projects and those projects in the survey sample (1 acre = 0.4 ha)

proportion to the number of projects within their boundaries with variations due to random selection.

The number and boundaries of Corps divisions were changed during an agency reorganization that took place after the survey was sent out. Because the former division boundaries form the basis for sample stratification, they are retained for use in this report.

## **Survey Questionnaire**

The survey questionnaire was 40 standard pages long and contained 94 questions, many with several parts. The questions were arranged in sections addressing projectwide, terrestrial, aquatic, wetland, threatened and endangered, and cultural resources. The survey was designed to be disaggregated into the individual sections so the project manager could distribute the different sections of the survey to appropriate resource specialists on staff. A facsimile of the questionnaire is provided in Appendix B.

The survey questionnaire was reviewed by a project steering committee and the research program Field Review Group proponent for this study. It was also pretested by the natural resource management staffs at the Lake Sonoma, California, and Granada Lake, Mississippi, projects. Questions were deleted, added, or modified based on these evaluations.

To maximize survey response rate and to ensure thoughtful responses, one member of the steering committee telephoned the manager of each project in the sample to explain the purpose and value of the survey and to encourage cooperation. Two weeks later, the questionnaire was mailed to the project manager under a cover letter from the Office of Chief, Natural Resources Branch, Headquarters, U.S. Army Corps of Engineers, requesting the participation of the project. The questionnaire was mailed in January 1996. It was completed and returned by 62 of 66 projects by August 1996, a response rate of approximately 94 percent.

## **Analysis of the Responses**

A database of survey responses was constructed to facilitate analysis by computer. A separate input format and attribute coding scheme were developed for each question or part of a question. Responses were entered by hand on a keypad.

Other questions required short answers or essay responses. Responses to these questions often varied widely in detail and specificity. To facilitate summarization, responses were subjectively classified by topic area. This was accomplished by writing individual responses on index cards and then arranging them into appropriate response categories. Responses, including category attributes, were then entered into a database for analysis.

Several questions asked respondents to identify the species associated with different management efforts. The respondents were not provided with guidance regarding naming conventions; however, most respondents provided common names. An attempt was made to use standard common names in reporting the results. To accomplish this, names were changed to a standard form during data entry in those cases where species identity was clearly indicated. In some instances, reported names such as “geese,” “grouse,” or “deer” did not identify a unique species. These names were usually entered as reported by respondents. In other cases, respondents purposely reported species groups such as nongame, waterfowl, or Neotropical birds. These were also generally entered as reported by respondents. Depending on the level of detail desired, taxonomic names were reported either with the same degree of specificity provided by respondents or else they were aggregated into more general categories.

Most results presented here provide national level summaries of natural resource management on projects. However, for many questions, regional responses were informally examined during data analysis; and where important regional differences were found, they were reported in footnotes to tables.

In answers to some questions, respondents provided estimates of land area in acres. These responses were reported in the tables in acres and in the text in both hectares and acres.

## 3 Results

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### Management Overview

Natural resource management activities on Corps projects are typically authorized for enhancement, mitigation, or stewardship. Many survey respondents indicated that their natural resource management programs were conducted under more than one type of authority; however, management activity on most projects (50 of 62) is most often performed for stewardship purposes (Table 2).<sup>1</sup> This gives individual projects considerable latitude in establishing natural resource management objectives and programs.

Eighty-seven percent of projects use project staff for natural resource management purposes (Table 3). Several administrative sources of guidance regarding natural resource management are available to these staff. In the formulation and implementation of management activities, 58-60 percent of Corps projects indicated that they referred to the project master plan, operational management plan, and the annual work plan always or sometimes, while project design memoranda, project environmental impact statements, and other sources of administrative guidance were used much less often (Table 2).

Corps projects use several different methods of implementing their natural resource management programs (Table 3). Most projects (87 percent) use their own staff to formulate and implement major aspects of their natural resource management programs. Volunteer effort (87 percent of projects), outgrants to other management agencies (63 percent), cooperative management arrangements (53 percent), and agricultural leasing (45 percent) are also used. Except for agricultural leasing, projects generally expect similar to increased utilization of these approaches during the next 10 years. Noteworthy are anticipated increases in the utilization of project staff (47 percent of surveyed projects), volunteers (42 percent), and cooperative agreements (26 percent) in the implementation of natural resource management programs.

Many projects receive a substantial amount of water-based and land-based recreation use. This is supported by an often considerable recreation

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<sup>1</sup> The survey question or questions furnishing data to each table are given in parentheses in table titles and applicable column headings.

infrastructure, such as campgrounds, day-use areas, and boater access facilities that encourage a high density of recreation use in some areas of the project. Many projects also have undeveloped lands and associated facilities that help support lower density recreation. Natural resource management is necessarily influenced by the needs of these visitors. Survey respondents identified 34 different types of natural resource issues important to project visitors and to people who reside near projects (Table 4). Most often listed were the quality of fishing (34 of 62 projects), water quality (25), access to land and water resources (13), the availability of hunting and land for hunting (12), water levels and water level fluctuations (12), and animal pests (11). More than half (55 percent) of the concerns about animal pests involved Canada geese.

People who live near projects have many of the same concerns as project visitors generally, including water quality, the quality of fishing opportunity, water levels, water fluctuations, and animal pests (Table 4). But they tended to be more concerned about shoreline management issues and resource stewardship on the project and less concerned about access to land and water resources and the availability of hunting and land for hunting.

Local residents had some unique concerns (Table 4). The most important of these were wildfires on the project, trespassing by project visitors onto private property, and control of weeds on the project. Also of concern primarily to local residents were the continuation of agricultural leasing, hazardous trees on the project near local homes, noise pollution emanating from the project, and the opportunity to realize economic gains based on their proximity to the project.

The use of lands along project boundaries can affect the management of natural resources on the project. Fifty-four (87 percent) of sixty-two projects noted land use changes occurring along project boundaries (Table 5). Two types of land use changes were noteworthy. Development along project boundaries was indicated by 44 of the 62 projects surveyed (71 percent). While the perceived seriousness of development was lower than the perceived seriousness of some other land use changes along project boundaries, 84 percent (37 of 44) of projects expected the level of development to increase during the next 10 years. Logging of land adjacent to projects was also noted by 14 (23 percent) projects. Projects tended to rate logging as one of the more serious activities; about half (57 percent) of projects citing logging activity along project boundaries expected the amount of logging to increase in the next 10 years.

Several types of problems that can affect natural resources or natural resource management occur on projects. From a list of selected factors, projects identified dumping of trash, use of off-road vehicles, shoreline erosion, and wildlife poaching as concerns with the greatest extent and severity (Table 6). Three of these are people-related problems. These, as well as other concerns indicated by respondents, have potential to adversely affect recreation, interfere with natural resource management, and divert staff time from more productive management activities.



## Management Budgets

Corps projects spent an average of 56 percent of their yearly budget on operations and 31 percent on park management. In contrast, they spent an average of 6.6 percent (0-29 percent) of their annual project budget on natural resources management (Table 7). More than half (53 percent) of natural resource management expenditures were made for terrestrial resource management. The remainder was divided among the management of aquatic resources (24 percent), wetland resources (11 percent), and threatened and endangered species (11 percent).

About half of the projects anticipate a project budget allocation during the next 10 years that is similar to the current allocation (Table 7). However, a sizable percentage of projects anticipate either a relative decrease (24 percent) or increase (30 percent) in expenditures for operations, an increase in expenditures for park management (35 percent), and an increase in expenditures for natural resource management, especially for the management of terrestrial resources (27 percent).

## Management Staff

Fifty-five of sixty-two projects (87 percent) used project staff to formulate and implement a natural resource management program (Table 3). While staff size reported by projects varied considerably, there was an average of 4.6 permanent full-time staff and 3.6 temporary or seasonal workers on staff in addition to the project manager. Of full-time staff, approximately 22 percent worked exclusively in park management, 9 percent worked exclusively on natural resource management, and 72 percent had responsibilities in both park and natural resource management (Table 8).

In most areas of natural resource responsibility, more than 95 percent of responsible management staff had bachelor's (81-97 percent) or master's (2-19 percent) degrees (Table 9). Typically, more than half (47-68 percent) held degrees in disciplines related to the resources they managed. Approximately 10 percent of wildlife resource managers and 13 percent of forest resource managers were professionally certified in their respective disciplines. Generally, projects with a larger natural resource base had a larger management program with more funds and more personnel. These projects were more likely to have natural resource management specialists with advanced education in disciplines closely related to their area of responsibility. Projects with a smaller natural resource base had smaller budgets and were more likely to be managed by personnel responsible for both park management and natural resource management. These personnel more frequently had an educational background in parks and recreation rather than in natural resources.

## Volunteer Effort

Forty-four of sixty-two Corps projects (78 percent) indicated that they used volunteer groups to help implement their natural resource management program (Table 3). Projects identified many different types of local groups that volunteer labor and sometimes supplies and funds for natural resource management (Table 10). Frequent volunteers included Boy and/or Girl Scout groups (34 of 44 projects), outdoor sporting clubs (24), conservation groups (15), and schools (7). These groups most commonly provided unskilled labor for tasks such as trail maintenance (30 of 44 projects), tree planting (21), general cleanup (15), and stacking brush for fish shelters (12). However some of these groups also provided skilled labor for tasks such as development and maintenance of food plots (7 of 44 projects), wildlife surveys (6), controlled burns (3), and water quality monitoring (2). Survey respondents indicated that approximately 52 percent of the management tasks performed by volunteers would be discontinued without voluntary contributions. Consequently, the effort of volunteers can provide real contributions to project management. Approximately 78 percent of arrangements with volunteer groups presently involve ongoing efforts as opposed to one-time contributions.

## Natural Resource Outgrants

Approximately 63 percent of Corps projects have outgrants for natural resource management purposes (Table 3). Survey respondents reported 67 outgrant tracts ranging from 42 to 39,863 ha (103 to 98,500 acres) in size, with most (67 percent) less than 2,000 ha (5,000 acres) (Table 11). Approximately 88 percent of these were outgranted to state natural resource management agencies, mostly for wildlife management and/or low-density recreation, such as hunting and hiking. On approximately 12 percent of outgrants, timber production was a primary use, although wildlife management and recreation were usually concomitant uses on these tracts.

Survey respondents reported that three to four natural resource outgrants were returned to projects by state agencies between 1985 and 1995 (Table 12). In three cases, the outgrants were returned because the state lacked the budget and/or personnel to manage them. Survey respondents did not anticipate the return of any additional outgrants, but they indicated that seven (Table 12) or eight (Table 11) new outgrants were possible in the next 10 years, a potential increase of 10-12 percent in the total number of natural resource outgrants.

## Agricultural Leases

Approximately 45 percent of projects lease from 1.6 to 4,000 ha (4 to nearly 10,000 acres) of land to farmers (Table 13). Approximately two thirds of the agricultural acreage is in the SWD, Missouri River (MRD), and Lower Mississippi Valley (LMVD) Divisions. Nearly half (46 percent), much of it in the SWD, is untilled acreage used for grazing or hay. The other 54 percent is cultivated primarily for soybeans, cotton, corn, and wheat.

On the whole, projects view agricultural leasing as an important part of their wildlife management programs. On average, they rate the benefits of agriculture leasing for wildlife to be greater than the benefits to the local farmers (Table 14). Seventeen of twenty-eight projects (61 percent) that utilize agricultural leasing indicated that they impose lease requirements that benefit wildlife. Most often required were crop residuals (43 percent), cover strips (29 percent), grazing or haying restrictions (25 percent), pesticide and/or herbicide restrictions (18 percent), and plowing restrictions (14 percent) (Table 14). Approximately 42 percent of cultivated lands employ low-till (35 percent) or no-till (7 percent) agricultural practices (Table 13).

Approximately 24 percent of cultivated land is regarded by projects as marginal for farming (Table 13). Twenty-one of twenty-eight projects (75 percent) with agricultural leases indicated that the acreage under lease has been declining, in part because farmers are either terminating leases or failing to renew them in agriculturally marginal fields (Table 15). Marginal agricultural lands removed from the leasing program are typically maintained in grassland, reforested by planting or natural succession, or managed as wetland. In the next 10 years, approximately 46 percent of projects that lease land for agriculture anticipate a continuing decline in the number of leases accepted by farmers.

## Terrestrial Resources

Over half of Corps fee holdings are contained in the land buffer surrounding most Corps water resource development projects. On some projects this area provides a large and important terrestrial resource base. Depending partly on geographical location, the terrestrial areas have a large proportion of forest or woodland (71 percent of projects), grassland (42 percent), and/or scrub/grassland (13 percent) (Table 16).

About half the projects have conducted general species inventories for the birds (58 percent), mammals (55 percent), plants (53 percent), reptiles/amphibians (50 percent), and invertebrates (32 percent) found on terrestrial habitats (Table 17). On average, about one-third of these inventories were fairly complete, while two-thirds were partially complete.

Seventy-one percent of Corps projects have forested lands in amounts ranging from 20 to 34,000 ha (50 to 84,000 acres) (Table 16). Approximately

half (55 percent) of all projects surveyed have 400 hectares (1,000 acres) or more in forest land. About three-fourths of projects with forested lands have bottomland (79 percent) and/or upland hardwoods (73 percent), comprising an average of 32 percent and 47 percent, respectively, of the total forest acreage (Table 18). About half the projects have mixed hardwood/conifer (51 percent) and/or natural conifer (43 percent), comprising an average of 31 percent and 19 percent, respectively, of the total forest acreage. About half of projects (51 percent) also have conifer plantations that make up an average of 7 percent of their total forest area.

Forest inventories or timber cruises, which provide data on timber resources and also contain valuable ecological data on forest conditions, are available on half (50 percent) of projects with forested land (Table 19). No standard forest inventory method is used on Corps projects; however, about 30 percent of projects with forest inventories employ the U.S. Forest Service Continuous Inventory Of Stand Condition Class.

Approximately 57 percent of projects have commercial timber harvests on their forested lands, using clear-cutting more commonly in conifers and selection-cutting more often in hardwoods (Table 20). Timber management is typically more intensive in conifers than hardwoods. On average, conifers have smaller stand sizes and shorter age rotations. They also have a smaller proportion of their acreage in old growth (Table 18). Most projects that harvest timber (91 percent) have harvest restrictions in riparian zones (Table 21). While timber production is an important management objective on some projects, it is more commonly viewed as a habitat management practice to achieve stewardship and wildlife management objectives (Table 22).

As part of terrestrial habitat efforts, most projects (84 percent) maintain old fields, pasture, and other openlands. These areas are often intensively managed by prescribed burning, mowing, and other practices designed to control habitat succession (Table 23). Forty-two percent of all projects have at least a quarter of their terrestrial acreage in grasslands, many of these in geographical areas dominated by natural grassland ecosystems. Of these, about a third (37 percent) allow grazing on an average of 26 percent of their available acreage.

Approximately 26 percent of surveyed projects reported native prairie habitat in amounts ranging from 20 to 2,000 ha (50 to 5,000 acres). All of these projects have their native prairie habitats under active management involving primarily maintenance by fire and other methods, restoration and reestablishment, and/or protection (Table 24).

About half of surveyed projects listed changes in forest and openland habitats that they anticipated during the next 10 years (Table 25). Responses were wide-ranging with no category listed by more than six (10 percent) projects. Projects with forested lands most often cited reforestation of some agricultural lands (five projects), ongoing recovery from recent flood damage (four), initiation or completion of a project forest management plan (three), and a general increase in forest acreage (three). The most often anticipated changes in openland habitats were the reforestation of openlands (six), the introduction or increased use of warm-season grasses (four), and the increased use of weed control (three).

## Terrestrial Wildlife Management

Projects rate public use and resource stewardship as the two most important factors motivating the management of their terrestrial resources (Table 22). They consider management for habitat diversity as their most important objective; however, they rate the importance of habitat management for game species higher than for nongame species. The gap is expected to narrow in the next 10 years, but habitat management for game species is expected to remain of greater importance in the mix of game and nongame management objectives (Table 22).

Some of the most important aspects of wildlife management on Corps projects are associated with broader efforts to manage forests, grasslands, riparian zones, agricultural areas, and other habitats. Typically these are large-scale efforts designed to establish and maintain a desirable mix of different habitat types and successional conditions appropriate for the locality and the primary management objectives. In addition, most projects (92 percent) employ an array of more specific wildlife management practices designed to further improve habitat conditions for selected wildlife and/or project visitors engaged in wildlife-related recreational activities (Table 26). Some commonly used wildlife management methods, such as food plots (68 percent of projects) and forest openings (39 percent), are directed primarily at game species. Others, such as snag management (42 percent), are targeted primarily at nongame species. But most wildlife management measures, including artificial nesting or roosting structures (79 percent), prescribed burning (58 percent), and agricultural crop specifications (34 percent), are used to benefit both game and nongame wildlife (Table 26). Prescribed burning probably has the widest range of uses for terrestrial wildlife management on Corps projects (Table 27).

As part of the wildlife management efforts for game and nongame species, some projects conduct regular surveys to monitor the size of selected species populations (71 percent of projects) and recruitment or breeding success of selected species (56 percent of projects). Population surveys are most often conducted for bald/golden eagles (29 percent of projects), songbirds (21 percent), deer (19 percent), quail (13 percent), and waterfowl (13 percent) (Table 28). Almost all recruitment surveys are targeted at birds, most often wood ducks (34 percent of projects) and bluebirds (31 percent) that use nest boxes on Corps projects (Table 29). Population and recruitment surveys are usually performed by project and/or state agency personnel, though, most often, project personnel conduct the surveys of nongame species and state wildlife management agencies conduct the surveys of game species.

Only 27 percent of respondents indicated that they monitor wildlife habitat conditions on Corps projects (Table 30). Approximately a third of responses indicated the use of subjective or informal habitat assessment methods. Formal monitoring surveys usually addressed a specific aspect of habitat condition, such as nest site availability (five projects) or mast production (five projects). Surprisingly, only two projects listed timber cruises or inventories as habitat monitoring surveys (Table 30). Ten projects use habitat assessment models to evaluate wildlife habitat conditions

(Table 31). Most often applied were Habitat Suitability Indices (six projects) and the Wildlife Habitat Appraisal Guide (two projects).

Overall, Corps projects are an important provider of hunting opportunity, and in many instances, Corps project lands provide a substantial amount of the public hunting opportunity available locally. Fifty-five of sixty-two projects (89 percent) surveyed allowed hunting for one or more game species (Table 32). The game species that are important on the largest number of projects are deer (89 percent), turkey (60 percent), rabbit (52 percent), quail (45 percent), waterfowl (44 percent), squirrel (44 percent), and pheasant (28 percent).

As part of their game management efforts, about half (45 percent) of the projects that allow hunting also monitor some part of the game harvest, usually with check stations (76 percent) or mail surveys (40 percent). While Corps personnel participate in these efforts on some projects, harvest monitoring activities are usually carried out by the state wildlife management agencies (Table 33).

Animal control is used on about two-thirds (68 percent) of Corps projects (Table 34). Control efforts are most often required for various nuisance wildlife (48 percent of projects) and for feral domestic animals (31 percent). Wild animal species most frequently involved in control efforts are beaver (24 percent of projects), Canada geese (18), and deer (16 percent). Predators, as a group, are involved in damage control efforts on about 11 percent of projects. About half of the projects that control animal damage anticipate that the need for control efforts will increase over the next 10 years.

## **Aquatic Resources and Management**

Most Corps projects are associated with a regulated river reach, often a reservoir pool. On average, projects rated these aquatic areas as the most significant habitats on their projects (Table 35). Presently, and over the next 10 years, water quality and the condition of the fishery were rated the two most important issues involving the management of aquatic resources (Table 36). Also important were pollution issues, sedimentation, and shoreline erosion. In general, projects rated concerns about the condition of resources higher than concerns about the utilization of resources.

Operational activities on Corps projects involve primarily regulating the timing and duration of water releases to meet objectives associated with flood control, navigation, hydropower, and other project purposes. On many projects, operational activities must also accommodate recreation and natural resource needs. Nearly all projects indicated that there were one or more aquatic resource issues of concern to project operations. Of these, water fluctuations and fishery considerations were rated as the most important (Table 37). These involved upstream concerns on 24-27 percent of projects, within-project concerns on 82-90 percent of projects, and downstream concerns on 60-63 percent of projects.

Thirty-four of the sixty-two projects (55 percent) listed restrictions on project operations that were intended to accommodate recreation and natural resource concerns (Table 38). Most restrictions involved requirements for a minimum water release (39 percent) to support the downstream fishery, or requirements for the seasonal maintenance of reservoir pool level (18 percent) for fisheries, recreation, and waterfowl.

Forty-seven projects (76 percent) listed a wide range of conflicts associated with the use and management of aquatic resources (Table 39). These fell into three general categories involving conflicts between different recreation user groups (61 percent of projects), between project operations and natural resource management (24 percent), and between operational activities and recreation users (24 percent). More than half of listed conflicts involved recreational fishing or fisheries management issues.

The most prevalent were conflicts among different recreational user groups, particularly between fishers and pleasure boaters (35 percent of projects) and between personal watercraft users and other boaters (29 percent) (Table 39). The severity of these conflicts was rated lower than that of most other conflicts identified by respondents, but most respondents listing these two concerns anticipated that their severity would increase over the next 10 years. Aquatic resource conflicts presently rated as the most severe tended to be the least prevalent. These included hydropower versus fisheries management (11 percent of projects), water level management versus fisheries management (3 percent), water level management versus recreation (3 percent), and irrigation versus recreation (3 percent) (Table 39). Respondents listing these concerns most often anticipated that their severity would remain the same in the next 10 years.

Water quality concerns have led to health-related advisories on 56 percent of Corps projects, mostly in regard to swimming (39 percent) and fish consumption (27 percent) (Table 40). Most swimming advisories were due to fecal coliform contamination. Fish consumption advisories were due typically to heavy metals, dioxin, and agricultural pesticides. About 15 percent of projects had one or more health advisories currently in effect, most in regard to fish consumption.

Nuisance levels of eight plant species and six animal species were reported in aquatic areas of 39 percent of projects (Table 41). Most often reported nuisance animals were zebra mussels (11 percent of projects) and beaver (6 percent). Most often cited nuisance plants were Eurasian water-milfoil (8 percent), hydrilla (5 percent), and purple loosestrife (5 percent). Most of the projects with nuisance level plants and animals indicated that infestation levels have increased over the last 10 years, and most of these expect additional increases in the next 10 years.

Fisheries resource issues were among the most important natural resource concerns of project staff, visitors, and local residents. This is indicated by responses to several different questions. Warmwater fishes, for example, were identified by project staff respondents as the most important biological resource on Corps projects (Table 35). Respondents also listed the condition of the fishery as the most important natural resource concern of project visitors and the second most important concern of individuals residing near projects (Table 4). Projects also rated the condition

of their fishery as the second most important aquatic resource management concern in the next 10 years, second only to water quality (Table 36). These results indicate the overall importance of fisheries management issues on Corps projects.

Fisheries management is ideally based on information about the condition of fishery resources and their utilization by fishers. The status of fisheries management programs on Corps projects was evaluated by the availability of this type of information. Survey respondents indicated that some type of fisheries management data has been collected on 54 of 62 projects (87 percent) (Table 42). Thirty-four projects (55 percent) indicated that they had creel survey data; half of these conduct creel surveys regularly, at 1- to 3-year intervals. Most of the projects that conduct creel surveys use the data to monitor fish harvest as well as determine selected biological attributes of the catch (e.g., length-weight statistics). About half use creel surveys to collect attitude/opinion data from fishers. Few projects collect information on the expenditures associated with fishing trips (Table 42).

About 73 percent of projects have fish stock assessment data collected most commonly by electroshocking (71 percent) and/or gill nets (52 percent) (Table 43). Approximately 80-85 percent of projects that collect stock assessment data do so regularly, at 1- to 3-year intervals. On almost all projects, the state has the primary responsibility for fishery management surveys. Corps projects contribute funding for fisheries management surveys on fewer than 10 percent of projects and personnel on fewer than 25 percent of projects (Table 43).

## **Wetland Resources and Management**

Fifty of sixty-two projects (81 percent) reported wetland habitats in amounts ranging from 0.4 to 22,000 ha (1 to 54,000 acres) (Table 44). Approximately 42 percent of projects reported more than 40 ha (100 acres) of wetlands; approximately 20 percent of projects had more than 400 ha (1,000 acres).

Twenty of fifty projects with wetlands (40 percent) indicated that they had a wetlands inventory (Table 45). However, most of these (70 percent) indicated that their inventories were based only on cursory surveys of project wetlands. Only 12 (24 percent) of 50 projects with wetlands reported having wetland inventories that were more than 80 percent complete, and only 2 additional projects (another 4 percent) expected to reach 80 percent completion within the next 5 years.

No standard wetland classification system was used on Corps projects. Projects most commonly reported using informal classification methods. Only two formal classification methods were in use (Table 46). Ten projects with wetlands (20 percent) used the Fish and Wildlife Service National Wetland Inventory system, and five (10 percent) used the Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987). Some projects appeared to use two or more different classification methods.



The 50 projects with wetlands rated the importance of nine potential management objectives. The highest rated were waterfowl management, biodiversity, and nongame wildlife management (Table 47). The most important management practices typically involved use of nesting structures, vegetation management, and moist soil management. Wetland management effort was directed at a broad range of wetland types and target species (Table 48). The high value placed on ecologically based management objectives and the broadly based management targets associated with wetland management contrasts with the management of terrestrial and aquatic resources, which tends to emphasize hunting and fishing recreation more explicitly.

Wetlands often are fragile habitats that may be adversely affected by factors largely beyond project control. Two such factors identified were the infestation of project wetlands by nuisance plants and animals and land use changes occurring along project boundaries. Thirty-eight percent of projects with wetlands listed one or more nuisance species present in project wetlands (Table 49). The list included 10 species of plants and 4 species of animals. Most often noted were purple loosestrife (five projects), beaver (four), and Canada goose (three). Most projects reporting these as nuisance wetland species indicated that their abundance has increased in the last 10 years, and will continue to increase over the next 10 years.

Twenty of fifty projects with wetlands identified ongoing or anticipated land use practices and changes along project boundaries that may affect project wetlands in the next 10 years (Table 50). Continuing development along project boundaries was by far (14 of 20 respondents) the most often cited off-project influence on project wetlands. Logging (four) and agriculture (four) were also cited by more than one project. Most of the anticipated effects of perimeter influences were detrimental. The most commonly listed were increased siltation (12 of 20 responses), increased pollution (3), reduced water quality (3), and increased surface runoff (3). Only 2 of 20 projects anticipated favorable changes: a reduction in agricultural activities resulting in reduced surface runoff and an improved wetland buffer.

## **Threatened and Endangered Species**

Forty-five of sixty-two surveyed projects (73 percent) reported that one or more federally listed threatened and/or endangered species occurred on their project (Table 51). Most commonly listed were birds (43 projects), invertebrates (7 projects), fish (6 projects), and plants (6 projects). The threatened bald eagle (proposed for delisting by U.S. Fish and Wildlife Service), reported by 38 projects (61 percent), was the most often cited species by a wide margin. Excluding the bald eagle, 29 respondents (47 percent) reported federally listed threatened or endangered species on their projects.

Efforts to identify threatened and endangered species on Corps projects are not yet complete. So far, 37 projects (61 percent) indicated that they

have initiated inventories to identify federally protected plants and/or animals (Table 52). Of these, only eight (13 percent) reported that inventories for protected species were 80-100 percent complete. In the next 10 years, this number is expected to increase to 12 projects (19 percent).

Efforts to identify threatened and endangered species on Corps projects have been conducted with varying degrees of rigor. In roughly equal numbers, projects identified their efforts as only cursory, thorough for selected groups, and thorough for all species (Table 53). Of projects that have initiated inventories, approximately 83 percent include birds and 50-57 percent include various other groups of federally listed species ranging from mammals (50 percent) to fish (57 percent). In addition, 76 percent of the projects that have initiated inventories of protected species have made some effort to include candidate species for Federal listing, and about half (55 percent) have made efforts to identify species on state protection lists (Table 53). About half (56 percent) of projects with species inventories have also made some effort to identify the critical habitats of protected species (Table 54).

In most instances, projects have the primary responsibility for stewardship of threatened and endangered species occurring on the projects. For about 82 percent of projects, these responsibilities are addressed in the project's Operational Management Plan (Table 55).

Thirty of forty-five projects (64 percent) with threatened or endangered species monitor the status of one or more species using population, recruitment, or habitat condition surveys (Table 56). Most of these projects (83 percent) conduct monitoring surveys for the bald eagle with these surveys. Half (50 percent) also monitor the status of selected other species.

As with other project natural resources, management of threatened and endangered species utilizes expertise and effort from other agencies. Inventory efforts include personnel from state agencies (72 percent) and the U.S. Fish and wildlife Service (52 percent) more often than from Corps projects (41 percent), or Corps districts and divisions (31 percent). About half (47 percent) of projects with threatened or endangered species also seek management assistance from other agencies (Table 52).

Seventeen of 45 projects (38 percent) that have a federally listed species indicated that their management of threatened and endangered species affects or is affected by various project activities, including project operations (12 projects), visitor recreation (11 projects), and natural resource management activities (6 projects) (Table 57). On seven projects (16 percent), management of listed species is also affected by activities such as the logging and development occurring along project boundaries.

Management of threatened and endangered species on natural resource outgrants is of special interest because of the interagency nature of natural resource management on these lands. Approximately 40 percent of projects with natural resource outgrants indicated that management activities associated with threatened and endangered species take place on their outgrants. Most often the lessee is responsible for these activities (Table 58).

Twenty-eight (62 percent) of forty-five projects with federally listed species have had informal consultations in the last 5 years with either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service regarding endangered species issues. Most were requests for assistance in identifying or managing endangered species on Corps projects (Table 59). However, nearly half (46 percent) of these projects asked for informal opinions regarding the effects of possible project actions on endangered species found on the project. In most cases, these issues were resolved informally. Projects reported only four instances in which formal Section 7 consultations were initiated, and of the three that were described in detail, all appeared to be primarily district actions rather than project actions (Table 60).

## **Unmet Management Needs**

All projects reported one or more unmet management needs associated with their aquatic, terrestrial, wetland, or threatened and endangered species resources. Forty-seven of sixty-two projects (76 percent) provided 52 responses concerning aquatic resources, more than for any resource category (Table 61). Thirty of the fifty-two aquatic resource responses (58 percent) identified management needs associated with improving project fisheries. Overall, fisheries management needs were identified more frequently than any other resource management need on the projects.

Respondents also listed 37 terrestrial resource management needs (Table 61). Additional funding and manpower (12) were mentioned most often, although uses for the needed funding and manpower were not specified. Specific terrestrial management needs most commonly identified habitat issues, particularly habitat restoration (six), additional habitat management (five), and habitat preservation (two).

The unmet wetland management needs most frequently listed were the construction of new wetlands (nine) and wetland inventories (seven). Similarly, implementation of species inventories (13) was the most frequently listed need in the management of threatened and endangered species (Table 61).

## 4 Discussion

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Natural resources management on Corps projects is part of the broader effort to operate projects for flood control, navigation, water supply, hydropower, and other project purposes. Within the scope of authorities provided by project authorizing legislation and other relevant laws and directives, Corps projects manage land and water resources for a mix of different uses, including agriculture, timber, fish, wildlife, watershed protection, and outdoor recreation. The natural resources component of Corps project management employs the multiple-use management concept (Headquarters, U.S. Army Corps of Engineers 1986, 1996b) and incorporates a mix of resource uses similar to that employed on U.S. Forest Service lands (Dana and Fairfax 1980; Loomis 1993).

A key feature of multiple-use management involves the need to balance different uses of available resources. Survey results indicate that, apart from operational considerations, recreation and resource stewardship are the two most important factors influencing natural resource management decision-making on Corps projects. In regard to aquatic resources, these needs translate primarily into fishing recreation and water quality, and in regard to terrestrial resources, they translate into game management and habitat diversity. Economic uses of the land, primarily agriculture and timber, are typically regarded as much lower priority uses than recreation and stewardship; where used, they are more often regarded as tools of habitat and wildlife management rather than primary resource uses.

Not all multiple-use management trade-offs can be balanced in a way that accommodates all desired resource uses. About three-fourths of Corps projects identified conflicts among project operations, recreation, and natural resource management. Most common (61 percent of projects) are conflicts among various recreation user groups, particularly between fishers and pleasure boaters (35 percent) and between personal watercraft users and participants in other water-based recreational activities (29 percent). Less common but considered more severe are the conflicts between project operations and both recreation and natural resource management noted by 24 percent of projects. Of these, operational activities involving hydropower production and flood control most often conflict with fisheries management and/or fishing recreation. In managing trade-offs between water operations goals and other project management objectives, about half (55 percent) of Corps projects utilize restrictions on project operational activities to accommodate recreation and/or natural resource concerns and management issues.

Balancing different uses of project natural resources is an ongoing process, in part, because of changing natural resource conditions on Corps projects. One of the most important trends for management on Corps projects may be the increasing development along property boundaries occurring on about three-fourths of projects. As boundary development increases, associated problems such as property encroachments may also increase. Hamilton and Reinert (1997) have shown that in a related situation, problems from extensive shoreline development on one Corps project diverted management effort away from more productive activities, producing a management program that was more reactive to development problems than proactive toward natural resource management. With anticipation of generally level to decreasing management budgets, similar management pressures may be encountered by projects experiencing boundary development and other problems that tend to divert management resources away from natural resource management activities.

The scope and nature of natural resource management on Corps projects depend in part on how projects value various project resources. In a direct comparison of selected resource types, projects rated aquatic areas such as reservoirs and river reaches within project boundaries as their most significant resource. These were followed by riparian corridors, wetlands, and then forest lands (Table 35). We believe that the reasons for this valuation involve a complex set of judgments about the institutional, ecological, and public use values of different resources (Doll et al. 1994; Apogee Research, Inc., 1996). Results of the survey provide some insight into how Corps projects apply these criteria.

Survey respondents consistently indicated that recreation use and natural resource stewardship most strongly influenced their perceptions and management of project resources, although the relative influence of these factors may differ for different types of resources. In terrestrial habitats, management of game species was reported to be more important than management of nongame wildlife or threatened and endangered species (Tables 22 and 35), suggesting that public use, particularly recreational hunting, has most strongly shaped value judgments about the significance and management of terrestrial resources on Corps projects. In regard to aquatic resources, both public use and stewardship considerations strongly influenced judgments about the value and management of these areas, but it is less clear which was most important. Depending on how the relevant questions were asked, either stewardship considerations (Table 36) or recreational use of fishes (Table 35) could be regarded as the more important factor in valuing the significance of aquatic resources.

While Corps projects generally view aquatic resources as more significant than terrestrial resources, they direct a larger share of the overall natural resource management program at terrestrial resources. On a budgetary basis, about half (53 percent) of project spending on natural resource management is directed at terrestrial resources, while 24 percent is directed at aquatic resources (Table 7). As a result, Corps projects describe a more expansive and varied terrestrial management program in their survey responses than they do an aquatic resource management program.

The survey results also suggest that Corps projects are more likely to increase their management efforts for terrestrial resources than for other

types of resources. When asked directly, more projects anticipated spending increases for management of terrestrial resources than for other resources (Table 7). Also, additional funding and/or manpower was cited as an unmet need far more often for the management of terrestrial resources than for the management of other resources (Table 61). These results suggest that there may be more potential demand for additional management of terrestrial resources than of other types of resources.

Management partners have an important influence on the overall scope and scale of natural resource management efforts on Corps projects. The most important management partner of the Corps project is usually a state natural resource management agency. Survey respondents list state natural resource management agencies as jointly or solely responsible for many natural resource management activities occurring on Corps projects. In fisheries management, the collection and evaluation of management data are primarily state responsibilities. State agencies are also active in terrestrial resource management, primarily for game management activities on natural resource outgrants. Overall, much of the management conducted by state agencies on Corps projects appears to support hunting and fishing recreation. Given the continued involvement of state agencies in the management of outgrants and aquatic resources, fish and game management will likely remain important management objectives on Corps projects.

Corps personnel are typically more active in terrestrial resource management than in aquatic resource management. The terrestrial management applied by project personnel seems to be roughly equally divided between game and nongame species. Corps efforts in nongame management appear to comprise most of the terrestrial nongame management occurring on Corps projects.

Survey respondents indicated that Corps projects most often directed natural resource management efforts toward selected individual species, groups of species, or the primary habitats of selected species. A large portion of the effort could reasonably be grouped into game and/or nongame management, and the projects themselves often used these terms when indicating management objectives or targets. Often nongame management recognized the importance of nonconsumptive wildlife recreation associated with wildlife viewing and related activities.

Natural resource management efforts in general, and wildlife management efforts in particular, are described in terms that suggest use-oriented management objectives, i.e., multiple-use management. It seems likely that resource stewardship is also thought of primarily in terms of resource uses. However, some projects describe management targets with terms that suggest more ecologically based management concepts such as biodiversity and ecosystem management. This is particularly evident in regard to wetland resources for which Corps projects explicitly rate species diversity as an objective that is second in importance only to waterfowl management (Table 47). It is also evident in attempts by some projects to direct management toward national or international resources such as Neotropical birds. However, the degree to which this type of recent ecological thinking is incorporated into natural resource management efforts on Corps projects is not readily apparent in the survey results.

As national and regional priorities for resource management become more clearly articulated, there is a growing desire to include them into natural resource management programs at all levels. A benefit of ecosystem management is the ability to more explicitly incorporate the broader national and regional priorities into natural resource management plans and activities. Most Corps involvement in formal ecosystem management has been coordinated by Corps districts or divisions and typically involved several different projects along a major waterway. Little evidence in the survey results suggests that Corps projects utilize ecosystem management as a primary approach to managing their local resources. However, Corps projects appear to be informally involved in some cooperative management activities that incorporate ecosystem management ideas, and the overall high degree of interagency participation in management activities on Corps projects indicates that projects have the cooperative management ethic required for effective ecosystem management.

Site characteristics suggest that resource management on Corps projects might benefit from application of ecosystem management concepts. For example, the riparian character of Corps projects creates relatively long property borders relative to the overall size of projects. As a result, land use and changes in land use occurring in the region surrounding projects are especially relevant in the management of project natural resources. In addition, Corps projects are an important component of major watersheds. Often Corps projects are responsible for management of only a portion of the entire watershed, but must consider the effects of project management activities on parts of the watershed that are outside project borders. For example, some projects are involved in management of conflicts concerning effects either upstream or downstream from their project (Table 37). These commonly involve ecosystem management issues.

Projects expect to maintain their strong commitment to a natural resource management program that directly supports recreation. At the same time, they also expect to increase their stewardship efforts for threatened and endangered species and other biological resources. They also recognize trends such as growing recreation demand and growing urbanization of the regional landscape that will increase natural resource management challenges in the near term. Overall, projects describe a need for more management effort, and many anticipate that at least some aspects of their programs will grow in the next 10 years. Accomplishing this will be especially challenging at a time when overall project budgets are not expected to increase greatly, if at all. An anticipated part of the solution is increased participation of non-Corps partners in the management of project resources. However, meeting future management needs may also require not just more management effort, but the development of more efficient and effective management strategies for meeting current and emerging challenges.

## 5 Summary

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Natural resources management on Corps of Engineers water resources development projects was documented from responses of management personnel to a lengthy and detailed questionnaire mailed to a stratified random sample of projects. The survey was sent in January 1996 to 66 Corps projects (19 percent of the sampling frame) selected at random within 10 Corps divisions located in the contiguous United States. Results are based on 62 completed questionnaires returned through August 1996, an overall response rate of approximately 94 percent.

Corps projects reported spending an average of 6.6 percent (0-29 percent) of their project budgets on natural resources management activities associated with terrestrial (53 percent of natural resources budget), aquatic (24 percent), and wetland (11 percent) resources and threatened and endangered species (11 percent). Approximately 87 percent of projects had project staff involved in natural resource management activities; 9 percent had staff involved exclusively in natural resources management, 72 percent had individuals who divided their time between park management and natural resources management activities.

Survey results suggested that natural resources management on Corps projects was directed primarily at a broad range of resource uses including outdoor recreation, fish, wildlife, timber, and agriculture. Management was also influenced by a stewardship ethic that emphasized water quality and habitat diversity. Natural resources management on Corps projects tended to be highly individualized because of project-specific differences in the type and condition of available resources; the availability of funding, personnel, and management partners; and the local physical and cultural environment surrounding each project.

On a scale from 1 to 10, respondents rated their aquatic resource base as the most significant resource on Corps projects (7.9). This was followed by riparian corridors (6.9), wetlands (6.7), and finally terrestrial resources (3.2-6.4), of which forested land (6.4) was viewed as most significant.

About half the total fee acreage of Corps projects supports an aquatic resource base composed mainly of impoundments on major waterways. The most important resource issues associated with the management of aquatic resources are water quality and condition of the recreational fishery. Management of aquatic resources on Corps projects involves balancing competing uses of aquatic resources among operations, recreation, and



natural resources management. Seventy-six percent of projects listed a wide range of resource use conflicts between different recreational user groups (61 percent of projects), between project operational activities and natural resources management (24 percent), and between operations and recreation users (24 percent). More than half of all listed conflicts involved recreational fishing or fisheries management issues.

Fisheries resource issues were among the most important natural resource concerns of project staff, visitors, and local residents. Survey respondents more often identified unmet management needs associated with aquatic resources than with any other type of resource on Corps projects. Most often listed, by 58 percent of projects, was the need to improve the condition of the project fishery.

Approximately half (53 percent) of the average natural resource budget on Corps projects is applied to the management of terrestrial resources. As a result, the terrestrial resource management efforts described by survey respondents were greater and more varied than those associated with other types of resources. The most important management objectives for terrestrial resources were recreation and habitat diversity. Management supporting recreation use of terrestrial resources was directed at both consumptive and nonconsumptive recreational activities, although management for game species was regarded as the more important. Hunting was allowed on 89 percent of Corps projects. Game species important on the greatest number of projects were deer (89 percent of projects), turkey (60 percent), rabbit (52 percent), and quail (45 percent).

Approximately 63 percent of surveyed projects outgranted from 40 to 40,000 ha (100 to 98,500 acres) of project land and water resources to other natural resource management agencies. Eighty-eight percent of natural resources outgrants were held by state fish and game agencies who managed these lands primarily for wildlife management and hunting recreation. Projects suggested that the number of outgrants could increase by 10-12 percent in the next 10 years.

Production of commercially valuable raw materials, primarily timber and agricultural products, was also an important aspect of terrestrial resource management on Corps projects. Commercial forestry was practiced on about 57 percent of projects, and where used, was an important aspect of habitat and wildlife management efforts. Agricultural leases existed on about 45 percent of projects. Leased acreage was most often used for hay or grazing (46 percent) and for cultivated crops (54 percent), primarily soybeans, cotton, corn, and wheat. Approximately 60 percent of the projects that offered agricultural leases to local farmers had lease requirements designed to benefit wildlife. Most often required were crop residuals, cover strips, and grazing or haying restrictions. Use of agricultural leasing is diminishing primarily because farmers are increasingly unable to continue leases on agriculturally marginal land.

Eighty-one percent of surveyed projects reported having wetlands in amounts from 0.4 to 22,000 ha (1 to 54,000 acres). The most important management objectives associated with wetlands were waterfowl, species biodiversity, and nongame wildlife. About half of projects with wetlands (56 percent) have begun a wetlands inventory based primarily on informal

methods (24 percent), the U.S. Fish and Wildlife Service National Wetland Inventory system (20 percent), or the Corps of Engineers Wetland Delineation Manual (10 percent). Projects most often cited the development of constructed wetlands and completion of wetland inventories as their most important wetland management needs.

Projects identified two principal threats to their wetlands. Forty percent of projects with wetlands indicated that land use changes along project boundaries were causing increased wetland sedimentation, increased pollution, reduced water quality, and other effects. Thirty-eight percent of projects with wetlands reported having nuisance plants or animals, and most of these anticipated an increase in wetland infestations in the next 10 years.

Federally listed threatened or endangered species were reported by 45 of 62 (73 percent) surveyed projects; more than half the surveyed projects (61 percent) reported the bald eagle, and about half (47 percent) reported other species. Efforts to identify threatened and endangered species on Corps projects were still ongoing; about 61 percent of projects had initiated inventories for threatened and endangered species, but most were not yet complete. Completion of a threatened and endangered species inventory was by far the most commonly cited need associated with the management of threatened and endangered species.

Project activities affected or were affected by threatened and endangered species on 38 percent of projects where listed species were known to occur. These activities included project operations (27 percent of projects with listed species), recreation (24 percent), and other natural resource management efforts (13 percent). In addition, activities occurring outside project boundaries, primarily logging and development, affected listed species on 16 percent of the projects where listed species were known to occur. Nearly half (46 percent) of projects with one or more threatened and/or endangered species had requested at least one informal opinion from the U.S. Fish and Wildlife Service within the last 5 years regarding the possible effects of a proposed project action on listed species. However, few informal consultations were ever elevated to formal Section 7 consultations.

Survey respondents indicated that natural resources management on Corps projects was motivated primarily by recreation and stewardship. The two most important goals associated with management of aquatic, terrestrial, and wetland resources always included one stewardship goal and one recreation goal. Water quality, habitat diversity, and species biodiversity were the primary stewardship goals associated with the management of aquatic, terrestrial, and wetland resources, respectively.

Recreation-related goals were usually associated with natural resource management activities aimed at selected individual species, groups of species, or the primary habitats of selected species. Much of this effort could be described as game and/or nongame management. Warmwater sport fishes, terrestrial game species, and waterfowl were the primary species-oriented management targets of aquatic, terrestrial, and wetland resource management, respectively. All of these are game species. Where direct

comparisons were made, survey respondents rated management for game species as more important than management for nongame species.

Contributions of management partners strongly influenced natural resource management on Corps projects. Most influential were state fish and wildlife agencies, which participated in some aspect of natural resource management on almost all Corps projects. State agencies typically managed most aspects of the recreational fishery on Corps projects. They also managed 88 percent of natural resource outgrants on Corps projects where game management and hunter recreation were the primary management objectives. While their efforts were not limited to these areas, much of the natural resource management conducted by state agencies on Corps projects supported fishing and hunting recreation.

Survey results suggested that Corps projects expect to maintain a strong commitment to a natural resource management program that supports recreation. At the same time, they see the need for and anticipate expansion of stewardship activities along a broad front. Completion of resource inventories, expansion of threatened and endangered species efforts, and increased management of nongame wildlife are among the stewardship activities that projects hope to pursue. They also recognize management challenges associated with increased development and other land use changes occurring along project boundaries. Projects expect to expand management efforts and meet emerging challenges with an expanded management role for project staff and with the increased participation of non-Corps partners in natural resource management activities.

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## **Tables**

Respondents provided estimates of land area in acres. To convert acres to hectares, multiply by 0.4047.

Entries in columns sum more than project totals because projects may have provided responses in more than one category.

Table 1. Selected population and sample characteristics of Corps water resource projects.

| Corps Divison <sup>a</sup> | Population Distribution   |                  |             |               | Sample Distribution |               |             |               |
|----------------------------|---------------------------|------------------|-------------|---------------|---------------------|---------------|-------------|---------------|
|                            | No. Projects <sup>b</sup> | Pct. of Projects | Total Acres | Pct. of Acres | Planned             |               | Realized    |               |
|                            |                           |                  |             |               | Sample Size         | Pct in Sample | Sample Size | Pct in Sample |
| Lower Mississippi Valley   | 21                        | 6.0              | 680,497     | 8.6           | 6                   | 28.6          | 6           | 28.6          |
| Missouri River             | 35                        | 10.0             | 2,086,099   | 26.3          | 6                   | 17.1          | 5           | 14.3          |
| New England                | 32                        | 9.2              | 51,953      | 0.7           | 6                   | 18.8          | 6           | 18.8          |
| North Atlantic             | 18                        | 5.2              | 90,187      | 1.1           | 6                   | 33.3          | 6           | 33.3          |
| North Central              | 16                        | 4.6              | 262,085     | 3.3           | 6                   | 37.5          | 6           | 37.5          |
| North Pacific              | 29                        | 8.3              | 265,750     | 3.4           | 6                   | 20.7          | 6           | 20.7          |
| Ohio River                 | 73                        | 20.9             | 922,305     | 11.6          | 9                   | 12.3          | 9           | 12.3          |
| South Atlantic             | 21                        | 6.0              | 953,424     | 12.0          | 6                   | 28.6          | 6           | 28.6          |
| South Pacific              | 18                        | 5.2              | 99,860      | 1.3           | 6                   | 33.3          | 4           | 22.2          |
| Southwest                  | 86                        | 24.6             | 2,506,944   | 31.7          | 9                   | 10.5          | 8           | 9.3           |
|                            |                           |                  |             |               |                     |               |             |               |
| Total                      | 349                       | 100.0            | 7,919,104   | 100.0         | 66                  |               | 62          |               |

<sup>a</sup> Reflects the divisions in place prior to the 1996 reorganization.

<sup>b</sup> Identifies the number of projects in the survey sample frame after deleting projects with no natural resource assets and combining projects managed by a single natural resource management office.



Table 2. Major sources of authority (Q4) and guidance (Q6) for natural resource management on Corps projects.

| Basis for Management Authority |                         |                                |     |      | Utilization of Selected Guidance |                         |                             |           |       |
|--------------------------------|-------------------------|--------------------------------|-----|------|----------------------------------|-------------------------|-----------------------------|-----------|-------|
| Authority                      | No. Projects Responding | Percent of Management Activity |     |      | Source of Guidance               | No. Projects Responding | No. Projects Using Guidance |           |       |
|                                |                         | Min                            | Max | Mean |                                  |                         | Always                      | Sometimes | Never |
| Enhancement                    | 31                      | 0                              | 100 | 7.5  | Design Memorandum                | 42                      | 5                           | 12        | 13    |
| Mitigation                     | 34                      | 0                              | 100 | 10.6 | Project EIS                      | 42                      | 9                           | 14        | 11    |
| Stewardship                    | 50                      | 0                              | 100 | 86.3 | Project Master Plan              | 43                      | 20                          | 16        | 3     |
| Others                         | 9                       | 30                             | 100 | 58.6 | Operational Management Plan      | 43                      | 26                          | 11        | 2     |
| Don't know                     | 11                      | 0                              | 100 | 33.2 | Annual Work Plan                 | 43                      | 25                          | 11        | 2     |
| Total                          | 62                      |                                |     |      | Others:                          |                         |                             |           |       |
|                                |                         |                                |     |      | ERGO <sup>a</sup>                | 3                       | 0                           | 3         | 0     |
|                                |                         |                                |     |      | State Management Plan            | 3                       | 1                           | 2         | 0     |
|                                |                         |                                |     |      | Miscellaneous others             | 7                       | 5                           | 2         | 0     |
|                                |                         |                                |     |      | Total                            | 62                      |                             |           |       |

<sup>a</sup> Environmental Review Guide for Operations

Table 3. Utilization of selected approaches to implementing natural resource management on Corps projects (Q17).

| Management<br>Implementation<br>Approach | No.<br>Projects<br>Reporting | Pct Of<br>Projects<br>Where Used | Change In Use Of Approach<br>In Next 10 Years<br>(No. of Projects) |      |          |
|--|------------------------------|----------------------------------|--|------|----------|
|  |                              |                                  | Decrease   | Same | Increase |
| Project Staff                            | 55                           | 87                               | 7  | 19   | 29       |
| Volunteers                               | 44                           | 78                               | 3  | 15   | 26       |
| Natural Resource Outgrants               | 37                           | 63                               | 3  | 26   | 8        |
| Cooperative Agreements                   | 32                           | 53                               | 3  | 13   | 16       |
| Agricultural Outleasing                  | 28                           | 45                               | 11   | 13   | 4        |
|  | —                            | —                                |  |      |          |
| Total                                    | 62                           | 100                              |  |      |          |

Table 4. Project staff evaluations of the natural resource concerns of project visitors (Q7) and local residents (Q8).

| Nature of Concern                           | No. Projects Noting Concerns Of |                  |
|---|---------------------------------|------------------|
|   | Project Visitors                | Nearby Residents |
| adequate fishery / fishing                  | 34                              | 24               |
| water quality / pollution                   | 25                              | 31               |
| water levels and fluctuations               | 12                              | 14               |
| shoreline management issues                 | 9                               | 14               |
| animal pests                                | 11 <sup>a</sup>                 | 10               |
| access to land/water                        | 13                              | 6                |
| availability of hunting/hunting lands       | 12                              | 7                |
| resource stewardship                        | 8                               | 10               |
| adequate/more game                          | 6                               | 8                |
| wildlife/habitat management                 | 7                               | 7                |
| forest management                           | 4                               | 8                |
| personal security / safety                  | 7                               | 4 <sup>b</sup>   |
| type and condition of recreation facilities | 9                               | 2                |
| wildlife watching                           | 8                               | 2                |
| aesthetics                                  | 5                               | 5 <sup>c</sup>   |
| dumping/litter                              | 4                               | 5                |
| siltation                                   | 2                               | 7                |
| threatened and endangered species           | 3                               | 5                |
| wildfires                                   | -                               | 8                |
| flooding                                    | 3                               | 4                |
| trespassing                                 | -                               | 7                |
| unspecified weeds                           | 1                               | 6                |
| user fees                                   | 5                               | -                |
| ATV's                                       | 1                               | 5                |
| nuisance aquatic vegetation                 | 2                               | 3                |
| restricted access/use                       | 3                               | 1                |
| poaching                                    | 2                               | 2                |
| availability of fire wood                   | 2                               | 1                |
| continuation of ag leases                   | -                               | 3                |
| economic opportunity                        | -                               | 3                |
| hazardous trees                             | -                               | 3                |
| increasing boundary development             | -                               | 3                |
| noise                                       | -                               | 3                |
| shade                                       | 2                               | -                |
| Total Projects Responding                   | 62                              | 62               |

<sup>a</sup> Six of these 11 were concerns about too many Canada geese.

<sup>b</sup> All 4 of these expressed concern about hunting activity along project boundaries near private residences.

<sup>c</sup> All of these involved the desire of neighboring landowners to cut trees on the project to create a lakeview vista from their homes.

Table 5. Trends in the use of lands bordering Corps projects (Q19).

| Types of Land Use<br>Changes Anticipated<br>Along Project Boundaries | No.<br>Projects<br>Responding | Present<br>Extent <sup>a</sup> |     | No. Projects Anticipating<br>Change In Next 10 years |          |      |          |
|--|-------------------------------|--------------------------------|-----|--|----------|------|----------|
|  |                               | Min                            | Max | Mean   | Decrease | Same | Increase |
| Continuing or Increasing:  |                               |                                |     |  |          |      |          |
| Development  | 44                            | 1                              | 10  | 5.9  | 0        | 7    | 37       |
| Logging  | 14                            | 2                              | 10  | 7.6  | 2        | 4    | 8        |
| Mining   | 3                             | 6                              | 10  | 8.0  | 0        | 0    | 3        |
| Refuse/Litter  | 2                             | 6                              | 7   | 7.5  | 1        | 0    | 1        |
| Land Privatization   | 1                             | 8                              | 8   | 8.0  | 0        | 0    | 1        |
| Decline in Water Quality   | 1                             | 4                              | 4   | 4.0  | 0        | 0    | 1        |
| Cover Type Changes Resulting In More:                                |                               |                                |     |  |          |      |          |
| Agricultural land  | 4                             | 2                              | 8   | 5.5  | 1        | 2    | 2        |
| Grazing land   | 4                             | 1                              | 10  | 4.4  | 1        | 0    | 3        |
| Clearing of forest land  | 2                             | 3                              | 3   | 3.0  | 0        | 0    | 2        |
| pine plantations   | 2                             | 3                              | 10  | 6.5  | 0        | 0    | 2        |
| Total Projects Responding  | 54                            |                                |     |  |          |      |          |

<sup>a</sup> Rating of extent ranged from 1 (minor) to 10 (extensive).

Table 6. Selected problems potentially affecting natural resources or natural management efforts on Corps projects (Q18).

| Selected Problem Area           | No. Projects Responding | Extent <sup>a</sup> |     |      | Severity <sup>b</sup> |     |      |
|---------------------------------|-------------------------|---------------------|-----|------|-----------------------|-----|------|
|                                 |                         | Min                 | Max | Mean | Min                   | Max | Mean |
| Dumping of trash                | 62                      | 0                   | 10  | 6.1  | 0                     | 10  | 5.7  |
| Off-road vehicles               | 62                      | 0                   | 10  | 5.4  | 0                     | 10  | 4.9  |
| Shoreline erosion               | 62                      | 0                   | 10  | 5.4  | 0                     | 10  | 5.0  |
| Wildlife poaching               | 62                      | 0                   | 10  | 4.4  | 0                     | 10  | 3.9  |
| Road/utility easements          | 62                      | 0                   | 10  | 4.2  | 0                     | 10  | 2.9  |
| Property encroachment           | 62                      | 0                   | 10  | 3.9  | 0                     | 10  | 2.9  |
| Livestock trespass              | 62                      | 0                   | 10  | 2.9  | 0                     | 10  | 2.1  |
| Vandalism of cultural resources | 62                      | 0                   | 10  | 2.5  | 0                     | 10  | 2.4  |
| Wildfires                       | 62                      | 0                   | 10  | 2.2  | 0                     | 10  | 1.9  |
| Theft of timber                 | 62                      | 0                   | 10  | 1.9  | 0                     | 10  | 2.1  |

<sup>a</sup> Extent rated from 0 (none) to 10 (common).

<sup>b</sup> Severity rated from 0 (none) to 10 (severe).

Table 7. Distribution of spending reported by Corps projects (Q1).

| Spending Area        | Pct Projects Spending in This Area <sup>a</sup> | Percent of Project Spending |     |      | No. Projects Anticipating Spending Change in Next 10 Yrs |          |      |
|----------------------|---|-----------------------------|-----|------|--|----------|------|
|                      |   | Min                         | Max | Mean | Decrease   | Increase | Same |
| Project O&M          | 99  | 0                           | 100 | 55.9 | 15   | 19       | 23   |
| Park O&M             | 95  | 0                           | 81  | 31.9 | 7  | 22       | 23   |
| Cultural Resources   | 66  | 0                           | 8   | 1.0  | 2  | 7        | 32   |
| Shoreline Management | 46  | 0                           | 19  | 1.8  | 4  | 4        | 30   |
| Natural Resources    | 72  | 0                           | 29  | 6.6  | -  | -        | -    |
| Terrestrial          | 69  | 0                           | 20  | 3.5  | 3  | 17       | 24   |
| Aquatic              | 48  | 0                           | 24  | 1.6  | 2  | 9        | 29   |
| Wetland              | 38  | 0                           | 7   | 0.7  | 2  | 10       | 22   |
| T&E                  | 35  | 0                           | 15  | 0.7  | 2  | 7        | 30   |
| Other                | 3   | 0                           | 25  | 1.4  | 1  | 6        | 1    |

<sup>a</sup> Based on all 62 projects responding.

Table 8. The availability and use of personnel (other than project manager) for park and/or natural resource management (Q2).

| Use of Personnel     | Full-time Equivalents (FTE's) |                  |     |     | Temporary or Seasonal Employees |                  |          |     |     |
|----------------------|-------------------------------|------------------|-----|-----|---------------------------------|------------------|----------|-----|-----|
|                      | No.                           | No. of Personnel |     |     | No.                             | No. of Personnel |          |     |     |
|                      |                               | Projects         | Min | Max |                                 | Mean             | Projects | Min | Max |
| Park Management      | 16                            |                  | 0   | 13  | 1.0                             | 22               | 0        | 12  | 1.5 |
| Nat. Res. Management | 14                            |                  | 0   | 9.5 | 0.4                             | 13               | 0        | 6   | 0.4 |
| Both                 | 53                            |                  | 0   | 26  | 3.3                             | 30               | 0        | 20  | 1.8 |
| Totals               | 59                            |                  | 0   | 53  | 4.6                             | 59               | 0        | 20  | 3.6 |

Table 9. Education and background of Corps project staff responsible for the management of natural and cultural resources (a3).

| Resource    | No. Projects Managing This Resource | Degree Level of Responsible Staff Member (Pct Distribution) |       |        | Degree in Relation To Resource <sup>a</sup> (Pct Distribution) |           | Percent Professionally Certified |
|-------------|-------------------------------------|---|-------|--------|--|-----------|----------------------------------|
|             |                                     | Assoc.  | Bach. | Master | Related  | Unrelated |                                  |
| Cultural    | 45                                  | 1   | 93    | 6      | 6 <sup>b</sup>   | 94        | 0                                |
| Fisheries   | 30                                  | 0   | 81    | 19     | 65   | 35        | 0                                |
| Forest      | 36                                  | 2   | 90    | 8      | 68   | 32        | 13                               |
| Range       | 17                                  | 0   | 97    | 3      | 61   | 39        | 0                                |
| T&E species | 30                                  | 6   | 88    | 6      | 47   | 53        | -                                |
| Wetlands    | 27                                  | 0   | 98    | 2      | 51   | 49        | 0                                |
| Wildlife    | 43                                  | 0   | 93    | 7      | 59   | 41        | 10                               |
| Total       | 62                                  |   |       |        |  |           |                                  |

<sup>a</sup> Resources on projects with substantial natural resource acreages are the most likely to be managed by natural resource specialists educated in a closely related scientific discipline. Resources on projects with little acreage are more likely to be managed by the project manager or rangers, who more frequently have college degrees in an unrelated area, often in park and recreation management.

<sup>b</sup> Few Corps projects have staff educated in disciplines related to cultural resource management because cultural resources on Corps projects are typically managed by District staff rather than project staff. Responsible project staff serve primarily as points-of-contact for cultural resource management.



Table 10. Contributions of volunteers to natural resource management on Corps projects (Q11).

| Participating Organizations       |                               | Management Activities            |                               |
|-----------------------------------|-------------------------------|----------------------------------|-------------------------------|
| Organization Name                 | No.<br>Projects<br>Responding | Description                      | No.<br>Projects<br>Responding |
| Scout troops                      | 34                            | Build/survey/maintain nest boxes | 35                            |
| School groups                     | 9                             | Trail maintenance                | 30                            |
| Sportsmen clubs                   | 7                             | Tree planting                    | 21                            |
| Fishing clubs                     | 7                             | General cleanup                  | 15                            |
| Quail Unlimited                   | 6                             | Unspecified habitat mgt          | 13                            |
| Equestrian clubs                  | 5                             | Brush piles for fish             | 12                            |
| Audubon Society chapters          | 3                             | Create/maintain food plots       | 7                             |
| Individual volunteers             | 3                             | Wildlife surveys                 | 6                             |
| Lake associations                 | 3                             | Erosion control                  | 2                             |
| Local businesses                  | 3                             | Stock fish                       | 3                             |
| Outdoor clubs                     | 3                             | Controlled burns                 | 3                             |
| Universities                      | 3                             | Water quality monitoring         | 2                             |
| Bike clubs                        | 2                             | Misc activities                  | 4                             |
| Birding clubs                     | 2                             |                                  | —                             |
| Church groups                     | 2                             |                                  | 49                            |
| Civic groups                      | 2                             |                                  |                               |
| Conservation clubs                | 2                             |                                  |                               |
| Waterfowl groups                  | 2                             |                                  |                               |
| Miscellaneous groups <sup>a</sup> | 16                            |                                  |                               |
|                                   | —                             |                                  |                               |
|                                   | 50                            |                                  |                               |

<sup>a</sup> Consists of volunteer organizations mentioned by only 1 project.

Table 11. Summary of natural resource outgrants reported by surveyed projects (Q12).<sup>a</sup>

| Acreage Summary    |               | Administrative Summary |               | Utilization Summary             |                 |
|--------------------|---------------|------------------------|---------------|---------------------------------|-----------------|
| Outgranted Acreage | No. Outgrants | Managing Agency        | No. Outgrants | Primary Uses <sup>c</sup>       | No. Responses   |
| 100 - 999          | 17            | Federal <sup>b</sup>   | 4             | Wildlife Management             | 35              |
| 1,000 - 4,999      | 23            | State                  | 59            | Waterfowl Management            | 8               |
| 5,000 - 9,999      | 9             | Local                  | 4             | Forestry/Timber Management      | 6               |
| 10,000 - 49,999    | 13            | University             | 1             | Fisheries Management            | 5               |
| 50,000 - 99,999    | 3             |                        | —             | Refuge/Preserve                 | 3               |
| not provided       | 2             | Total                  | 67            | General Recreation <sup>c</sup> | 18              |
|                    | —             |                        |               | Hunting                         | 8               |
| Total              | 67            |                        |               | Hiking                          | 3               |
|                    |               |                        |               | Total                           | 86 <sup>d</sup> |

<sup>a</sup> Information from 67 natural resource outgrants reported by 47 different projects. Excludes outgrants of developed recreation areas, such as boatramps or campgrounds, that were reported here by some respondents.

<sup>b</sup> Refers to Federal agencies other than the Corps of Engineers.

<sup>c</sup> Type of recreation was either unspecified or several types of low-density recreation were indicated.

<sup>d</sup> Total exceeds number of outgrants because more than one primary use was listed for some outgrants.

Table 12. Changes in the status of natural resource outgrants on Corps projects (Q13 and Q14).

| Characteristics of outgrants returned in the last 10 years <sup>a</sup> (Q13) |                              |        |                   |                            |                             | Prospects For<br>Future Outgrants (Q14) |                 |
|---|------------------------------|--------|-------------------|----------------------------|-----------------------------|---|-----------------|
| Division  | Managing<br>Agency           | Acres  | Year Of<br>Return | Primary Use                | Reason For Return           | Response                                | No.<br>Projects |
| NAD   | County Parks Dept            | 100+   | <2000             | park                       | inadequate budget/personnel | No                                      | 43              |
| SND   | County Parks                 | 230    |                   | park                       | inadequate budget/personnel | Yes                                     | 5               |
| LWVD  | Future Farmers<br>of America | 400    | 1991              | recreation/agric/education | reorganization              | Maybe                                   | 2               |
| SAD   | State Fish & Game            | 430    | 1980's            | wildlife management        | inadequate budget/personnel |   | 51              |
| LWVD  | State Fish & Game            | 785    | 1995              | hunting and hiking         | land unsuitable for purpose |   |                 |
| NPD   | State Fish & Game            | 2,158  | 1985              | wildlife/waterfowl mgt     | inadequate budget           |   |                 |
| SND   | State Fish & Game            | 10,000 | 1992              | ag outgrant for wildl mgt  | inadequate budget/personnel |   |                 |

<sup>a</sup> While information on natural resource outgrants was requested, the 7 responses included 4 natural resource outgrants, 2 park or recreation area outgrants, and 1 probable agricultural outgrant.

Table 13. Characteristics of the agricultural leasing program on Corps projects (Q16a-d).

| Distribution of Acreage |                         |                    |                     |       |       |  |            |                               |                  |             |
|-------------------------|-------------------------|--------------------|---------------------|-------|-------|--|------------|-------------------------------|------------------|-------------|
| Division                | No. Projects Responding | No. With Ag Leases | Per Project Acreage |       |       | Pct Crop Acreage That Is Marginal For Farming <sup>a</sup> | Crop Types |                               | Soil Preparation |             |
|                         |                         |                    | Min                 | Max   | Mean  |  | Crop       | Pct of Total Reported Acreage | Tillage Method   | Pct Acreage |
| LMVD                    | 6                       | 4                  | 400                 | 9,180 | 3,938 | 51   | grazing    | 29                            | Conventional     | 58          |
| MRD                     | 5                       | 3                  | 1,286               | 8,156 | 3,971 | 25   | hay        | 17                            | Low Till         | 35          |
| NAD                     | 6                       | 1                  | 1,120               | 1,120 | 1,120 | 0  | soybeans   | 17                            | No Till          | 7           |
| NCD                     | 6                       | 2                  | 4                   | 720   | 362   | 8  | cotton     | 9                             | Total            | —           |
| NED                     | 6                       | 2                  | 6                   | 325   | 165   | 0  | corn       | 6                             |                  | 100         |
| NPD                     | 6                       | 3                  | 4                   | 1,000 | 380   | 33   | wheat      | 4                             |                  |             |
| ORD                     | 9                       | 4                  | 200                 | 2,310 | 1,251 | 4  | milo       | 2                             |                  |             |
| SAD                     | 6                       | 3                  | 80                  | 1,700 | 727   | 60   | others     | 16 <sup>b</sup>               |                  |             |
| SPD                     | 4                       | 1                  | 93                  | 93    | 93    | 0  |            | —                             |                  |             |
| SUD                     | 8                       | 5                  | 94                  | 9,700 | 4,666 | 37   | Total      | 100                           |                  |             |
| Overall                 | 62                      | 28                 | 4                   | 9,700 | 2,716 | 24   |            |                               |                  |             |

<sup>a</sup> Calculations exclude acreage for pasture and hay.

<sup>b</sup> Consists mostly of unspecified acreage combinations of soybeans, wheat, and corn.

Table 14. Program (Q16e) and wildlife (Q16f) benefits associated with agricultural leasing.

| Perceived Benefits Of Ag Leasing Program (Q16e) |                               |   | Lease Requirements Benefiting Wildlife (Q16f) |                               |
|---|-------------------------------|---|---|-------------------------------|
| Benefit   | No.<br>Projects<br>Responding | Importance<br>Of Benefit <sup>a</sup><br>(mean ranking) | Lease Requirement                             | No.<br>Projects<br>Responding |
| Wildlife  | 26                            | 1.6   | Leave crop residuals                          | 12                            |
| Cover type mgt                                  | 21                            | 2.1   | Provide cover strips                          | 8                             |
| Local farmers                                   | 21                            | 3.0   | Grazing/haying restrictions                   | 7                             |
| Local tax base                                  | 19                            | 3.4   | Pesticide/herbicide restrictions              | 5                             |
| Others <sup>b</sup>                             | 12                            | -   | Plowing restrictions                          | 4                             |
|   | —                             |   | Delayed harvest requirements                  | 3                             |
| Total Projects                                  | 28                            |   | Provide food plots                            | 3                             |
|   |                               |   | Provide winter cover crop                     | 1                             |
|   |                               |   | Restrictions on crop type                     | 1                             |
|   |                               |   | Total Projects                                | 17                            |

<sup>a</sup> Projects ranked listed benefits from 1 (most important) to 5 (least important).

<sup>b</sup> Other benefits cited for use of agricultural leasing were: vegetation control, wildfire control, reduce need for burning, maintaining openland for future wildlife management objectives, reduce need for mowing, and public relations.

Table 15. Effects of changes in agricultural leasing on Corps projects (Q16g and Q16h).

| Fate Of Land That Has Been Removed<br>From Agricultural Leasing Program (Q16g) |                               | Anticipated Changes in Agriculture<br>Leasing In The Next 10 Years (Q16h) |                               |
|--|-------------------------------|---|-------------------------------|
| Uses   | No.<br>Projects<br>Responding | Description   | No.<br>Projects<br>Responding |
| Maintain as grasslands   | 12                            | Reduce agricultural leasing   | 11                            |
| Allow succession to climax   | 7                             | reforestation (3)   |                               |
| Reforestation  | 4                             | convert to wetlands (2)   |                               |
| Unspecified tree planting  | 3                             | eliminate marginal leases (2)   |                               |
| Create wetlands  | 2                             | plant trees (1)   |                               |
| Burn for unspecified purposes  | 2                             | Introduce cover strips  | 2                             |
| Create pine plantation   | 1                             | Create terraces   | 1                             |
|  | —                             | Decrease no-till acreage  | 1                             |
| Total Projects   | 21                            | Relax grazing restrictions  | 1                             |
|  |                               | Eliminate grazing   | 1                             |
|  |                               | Discontinue all ag leasing  | 1                             |
|  |                               |   | —                             |
|  |                               | Total Projects  | 16                            |

Table 16. Major terrestrial cover types on Corps project lands (Q20).

| Cover Type      | No. Projects Responding | Acreage |        |       | Percent of Project Terrestrial Acreage |     |      | No. Of Projects On Which Cover Type Exceeds 25% Of Terrestrial Acreage |
|-----------------|-------------------------|---------|--------|-------|--|-----|------|--|
|                 |                         | Min     | Max    | Mean  | Min                                    | Max | Mean |  |
| Grassland       | 52                      | 50      | 28,600 | 3,083 | 1                                      | 100 | 63   | 26   |
| Forest/Woodland | 50                      | 50      | 86,480 | 9,156 | 1                                      | 100 | 35   | 44   |
| Scrub/Brushland | 39                      | 15      | 12,570 | 1,832 | 1                                      | 94  | 24   | 13 <sup>a</sup>  |
| Total Projects  | 62                      |         |        |       |  |     |      |  |

<sup>a</sup> Eight of these are projects with desert shrub ecotypes in the North Pacific (3), Southwest (3), and South Pacific (2) Divisions. The remaining 5 are projects extensive with shrub or brushlands in the Ohio River (3), New England (1), and North Atlantic (1) Divisions.





Table 18. Selected characteristics of major forest types occurring on Corps projects (Q26).

| Forest Type            | Composition of Forested Land |     |                   |      |  | Available Old Growth Forest <sup>a</sup> |     |                 |      |  | Forest Stand Size |     |       |      |  | Stand Rotation Age |     |       |      |  |
|------------------------|------------------------------|-----|-------------------|------|--|--|-----|-----------------|------|--|-------------------|-----|-------|------|--|--------------------|-----|-------|------|--|
|                        | No. Projects                 |     | Percent of Forest |      |  | No. Projects                             |     | Percent of Type |      |  | No. Projects      |     | Acres |      |  | No. Projects       |     | Years |      |  |
|                        |                              |     |                   |      |  |  |     |                 |      |  |                   |     |       |      |  |                    |     |       |      |  |
|                        | Responding                   | Min | Max               | Mean |  | Responding                               | Min | Max             | Mean |  | Responding        | Min | Max   | Mean |  | Responding         | Min | Max   | Mean |  |
| Upland hardwood        | 27                           | 3   | 100               | 47   |  | 22                                       | 0   | 70              | 17   |  | 21 <sup>b</sup>   | 5   | 500   | 87   |  | 10                 | 75  | 200   | 110  |  |
| Bottomland hardwood    | 29                           | 2   | 100               | 32   |  | 22                                       | 0   | 80              | 16   |  | 24                | 3   | 877   | 107  |  | 7                  | 60  | 200   | 101  |  |
| Mixed conifer/hardwood | 19                           | 1   | 100               | 31   |  | 14                                       | 0   | 75              | 9    |  | 17                | 1   | 500   | 60   |  | 8                  | 50  | 120   | 85   |  |
| Natural conifer        | 16                           | 1   | 95                | 19   |  | 11                                       | 0   | 100             | 10   |  | 12                | <1  | 408   | 49   |  | 6                  | 50  | 80    | 63   |  |
| Plantation conifer     | 19                           | 1   | 35                | 7    |  | 13                                       | 0   | 2               | 0    |  | 14                | <1  | 100   | 20   |  | 7                  | 50  | 100   | 70   |  |
|                        | —                            |     |                   |      |  | —  |     |                 |      |  | —                 |     |       |      |  | —                  |     |       |      |  |
| Total Projects         | 37                           |     |                   |      |  | 27                                       |     |                 |      |  | 30                |     |       |      |  | 14                 |     |       |      |  |

<sup>a</sup> Definitions of old growth may vary by project.

<sup>b</sup> The summary of stand size in upland hardwoods omits one project that reported its entire forested area of 16,563 acres as a single stand.

Table 19. Availability of forest inventories of Corps project lands (Q25).

| Current Forest Inventory (Q25a) |                         | Forest Inventory Systems (Q25b)    |                         | Forest Inventory Participants (Q25c) |                         |
|---------------------------------|-------------------------|------------------------------------|-------------------------|--------------------------------------|-------------------------|
| Availability                    | No. Projects Responding | Method Reported                    | No. Projects Responding | Affiliation                          | No. Projects Responding |
| Yes                             | 23                      | US Forest Service Continuous       | 7                       | Project forester                     | 16                      |
| No                              | 23                      | Inventory of Stand Condition Class |                         | Unspecified project personnel        | 13                      |
| Not applicable                  | 13                      | Non-permanent plots                | 4                       | State forestry agency                | 11                      |
|                                 | —                       | Permanent plots                    | 3                       | Consulting forester                  | 5                       |
| Total Projects                  | 59                      | State method                       | 2                       | Student intern                       | 2                       |
|                                 |                         | Natural Resource Inventory System  | 1                       | U.S. Fish and Wildlife Service       | 2                       |
|                                 |                         | Silvoh Forest Inventory System     | 1                       | State wildlife management agency     | 1                       |
|                                 |                         | Unspecified                        | 4                       |                                      | —                       |
|                                 |                         | Total Projects Responding          | 22                      | Total Projects Responding            | 23                      |

Table 20. Selected aspects of forest management on Corps projects (Q27 and Q29).

| Primary Harvest Method (Q27)         |                               |                           |     | Fuelwood Removal By Project Visitors (Q29) |                  |                           |                  |
|--------------------------------------|-------------------------------|---------------------------|-----|--|------------------|---------------------------|------------------|
| Forest Type<br>and<br>Cutting Method | No.<br>Projects<br>Responding | Percent of<br>Forest Type |     | Allowable Removal<br>Methods               | No.<br>Responses | Percent Of<br>Forest Open |                  |
|                                      |                               | Min                       | Max |  |                  | To Removal                | No.<br>Responses |
| Conifers                             |                               |                           |     | Dead standing timber                       | 18               | 1                         | 10               |
| Clear cut                            | 11                            | 10                        | 100 | Fallen trees                               | 25               | 11                        | 25               |
| Selection cut                        | 11                            | 10                        | 100 | Residual tree parts                        | 12               | 26                        | 50               |
|                                      |                               |                           |     | Harvest debris                             | 6                | 51                        | 75               |
| Hardwoods                            |                               |                           |     |  | —                | 76                        | 100              |
| Clear cut                            | 8                             | 1                         | 100 | Total Responses                            | 30               |                           | —                |
| Selection cut                        | 15                            | 2                         | 100 |  |                  | Total Responses           | 23               |
|                                      |                               |                           |     |  |                  |                           |                  |
| Total Projects                       | 20                            |                           |     |  |                  |                           |                  |

Table 21. Occurrence (Q32a) and management (Q32b) of riparian zones on Corps projects.

| Occurrence on Corps Projects (Q32a) |                         |  | Use of Selected Management Practices (Q32b) |                         |                             |           |
|-------------------------------------|-------------------------|--|---|-------------------------|-----------------------------|-----------|
| Percent Occurrence                  | No. Projects Responding |  | Practice                                    | No. Projects Responding | No. Projects Using Practice |           |
|                                     |                         |  |   |                         | Sometimes                   | Regularly |
| 1 - 2                               | 12                      |  | Bank protection                             | 39                      | 32                          | 7         |
| 3 - 5                               | 7                       |  | Buffer zone/corridor management             | 39                      | 16                          | 23        |
| 5 - 10                              | 9                       |  | Access restriction/fencing                  | 31                      | 19                          | 12        |
| 10 - 20                             | 12                      |  | Revegetation/restoration                    | 36                      | 29                          | 7         |
| 20 - 30                             | 10                      |  | Stream improvement                          | 21                      | 20                          | 1         |
| 30 - 40                             | 4                       |  | Timber harvest restrictions                 | 32                      | 7                           | 25        |
| 40 - 50                             | 0                       |  |   | —                       |                             |           |
| 50 - 100                            | 6                       |  | Total Projects Responding                   | 57                      |                             |           |
| Total Projects                      | 60                      |  |   |                         |                             |           |



Table 23. Selected aspects of the management of grasslands and other openlands on Corps projects (Q33b and Q36).

| Use of Selected Management Practices (Q35) |                               |                               | Percent of Natural Grasslands<br>Used For Grazing (Q33b) |                               |
|--|-------------------------------|-------------------------------|--|-------------------------------|
| Practice                                   | No.<br>Projects<br>Responding | No. of Projects<br>Where Used |  | No.<br>Projects<br>Responding |
|  |                               | Sometimes                     | Regularly  |                               |
| Prescribed burning                         | 36                            | 16                            | 20   | 19                            |
| Bush hogging                               | 38                            | 15                            | 23   | 5                             |
| Chaining/cabling                           | 5                             | 3                             | 2  | 2                             |
| Disking/plowing                            | 38                            | 15                            | 23   | 2                             |
| Mowing                                     | 45                            | 11                            | 34   | 2                             |
| Seeding/planting                           | 49                            | 21                            | 28   | 0                             |
| Total Projects                             | 53                            | Total Projects                |  | 30                            |

Table 24. Status of native prairie on Corps projects (037).

| Occurrence of Prairie on Projects |    |      |      |      | Availability of Habitat Inventories On Corps Prairie Lands |    |                              |  |                               | Prairie Management Practices |                         |  |      |  |
|-----------------------------------|----|------|------|------|--|----|------------------------------|--|-------------------------------|------------------------------|-------------------------|--|------|--|
|                                   |    |      |      |      | Status of Inventory  |    |                              | Participating Organizations <sup>a</sup> |                               |                              |                         |  |      |  |
|                                   |    |      |      |      | No. Projects Responding                                    |    | No. Projects Responding      |  |                               |                              |                         |  |      |  |
|                                   |    |      |      |      | Status   |    | Organization                 |  | Practice                      |                              | No. Projects Responding |  |      |  |
|                                   |    |      |      |      | Division   |    | Responding                   |  | Min                           |                              | Max                     |  | Mean |  |
| LMVD                              | 2  | 140  | 4500 | 2320 | Partly complete  | 10 | State agency                 | 4  | Prescribed burning            | 12                           |                         |  |      |  |
| MRD                               | 1  | 5000 | 5000 | 5000 | None   | 5  | US Fish and Wildlife Service | 2  | Planting of prairie species   | 9                            |                         |  |      |  |
| NCD                               | 6  | 5    | 210  | 64   | Complete   | 1  | Voluntary organizations      |  | Habitat protection            | 5                            |                         |  |      |  |
| ORD                               | 4  | 6    | 120  | 44   |  | —  | Quail Unlimited              | 2  | Establish/reestablish prairie | 4                            |                         |  |      |  |
| SAD                               | 1  | 35   | 35   | 35   | Total Projects   | 16 | Unidentified volunteers      | 2  | Habitat management            | 4                            |                         |  |      |  |
| SWD                               | 2  | 687  | 1150 | 919  |  |    | Boy Scouts                   | 1  | Restoration of old fields     | 2                            |                         |  |      |  |
|                                   | —  | —    | —    | —    |  |    | National Audubon Society     | 1  | Unspecified rotation          | 2                            |                         |  |      |  |
| All                               | 16 | 5    | 5000 | 754  |  |    | Pheasants Forever            | 1  | Monitoring conditions         | 1                            |                         |  |      |  |
|                                   |    |      |      |      |  |    | Sierra Club                  | 1  | Rotational mowing             | 1                            |                         |  |      |  |
|                                   |    |      |      |      |  |    | Total Projects               | 11                                       | Outgrant management           | 1                            |                         |  |      |  |
|                                   |    |      |      |      |  |    |                              |  | Total Projects                | 16                           |                         |  |      |  |

<sup>a</sup> Does not include participation of Corps projects

Table 25. Anticipated changes on forest lands (Q31) and grasslands and other terrestrial openlands (Q36).

| Ongoing And/Or Anticipated Changes On Forest Lands<br>And Their Management (Q31) |                               | Anticipated Changes On Openlands In Next 10 Years (Q36) |                               |
|--|-------------------------------|---|-------------------------------|
| Anticipated Changes  | No.<br>Projects<br>Responding | Anticipated Changes                                     | No.<br>Projects<br>Responding |
| Reforestation of some agricultural land  | 5                             | Reforestation   | 6                             |
| Recover flood-damaged forest land  | 4                             | Restore/increase warm-season grasses                    | 4                             |
| Initiate/complete forest management plan   | 3                             | Increase weed control                                   | 3                             |
| Increase forest acreage  | 3                             | Reestablish prairie                                     | 2                             |
| Loss of pine to pine beetles   | 2                             | Increase prescribed burning                             | 2                             |
| Improve riparian woodlands   | 2                             | Initiate/increase bush hogging                          | 2                             |
| Continue/increase timber harvest   | 2                             | Allow natural succession                                | 2                             |
| Increase controlled burns in forest stands                                       | 1                             | Deterioration of range/grassland                        | 2                             |
| Continued succession from pine to hardwood                                       | 1                             | Encourage native plants                                 | 2                             |
| Declining natural regeneration of bottomland forest                              | 1                             | Decrease seeding/mowing                                 | 2                             |
| Convert some forest to openland turkey brood range                               | 1                             | Reduce management (budget cuts)                         | 1                             |
|  | —                             | Restoration of degraded grasslands                      | 1                             |
| Total Projects Responding  | 25                            | Increase hay cutting                                    | 1                             |
|  |                               | Increase grassland acreage                              | 1                             |
|  |                               | Unspecified changes:                                    |                               |
|  |                               | Reclamation   | 1                             |
|  |                               | Habitat changes due to flooding                         | 1                             |
|  |                               | Vegetation restoration                                  | 1                             |
|  |                               | Total Projects Responding                               | 20                            |



Table 26. Use of selected terrestrial wildlife management practices on Corps projects (Q40).

| Selected Terrestrial Wildlife Management Practices <sup>a</sup> |                               |   | Responsible Organization |                  |
|---|-------------------------------|---|--------------------------|------------------|
| Management Practice   | No.<br>Projects<br>Responding | Target Species/Taxa (No. Responses)   | Organization             | No.<br>Responses |
| Nesting/roosting structures                                     | 49                            | Bluebirds (31), Wood duck (30), Owls/hawks (22), Waterfowl (17), Bats (7), Other (28) | Project only             | 351              |
| Food plots or patches   | 42                            | Deer (20), Nongame (16), Turkey (14), Quail/dove (14), Other game (29), Other (7)     | State only               | 196              |
| Prescribed burning  | 36                            | Various nongame (22), Deer (9), Turkey (8), Other game (21), Other (4)                | Project/state jointly    | 133              |
| Other food or cover planting                                    | 35                            | Songbirds (8), Deer (7), Turkey (7), Quail (6), Rabbit (5), Other (41)                | Federal <sup>b</sup>     | 36               |
| Edge maintenance  | 34                            | Songbirds/nongame (18), Deer (15), Turkey (10), Quail/Grouse (9), Other game (17)     | Volunteer <sup>c</sup>   | 27               |
| Snag management   | 26                            | Woodpeckers/other birds (14), Cavity nesters/dwellers (9), Other (15)                 | Contractor <sup>d</sup>  | 9                |
| Forest openings   | 24                            | Deer (15), Turkey (11), Grouse (4), Songbirds (3), Other (15)                         | County                   | 1                |
| Crop specification  | 21                            | Nongame (10), Ducks/geese (8), Deer (7), Other game (13), Other (4)                   | Other <sup>e</sup>       | 29               |
| Fences and crossings  | 19                            | Various nongame (11), Upland game (8), Deer (3), Livestock (2)                        | Total Responses          | 782              |
| Forest density  | 18                            | Small game (11), Deer (10), Turkey (7), Nongame/songbirds (7), Other (2)              |                          |                  |
| Water supply  | 17                            | Waterfowl (9), Deer (2), Upland birds (2), Other (10)                                 |                          |                  |
| Corridor development  | 13                            | Various nongame (8), Small game (5), Deer (4), Turkey (2), Other (5)                  |                          |                  |
| Stocking  | 12                            | Pheasant (6), Turkey (4), Canada goose (2), Other (6)                                 |                          |                  |
| Supplemental feeding  | 7                             | Deer (5), Turkey (4), Waterfowl (2), Other (1)  |                          |                  |
| Pasture development   | 7                             | Various grasses (5), Songbirds (2), Other (5)   |                          |                  |
| Total Projects Responding                                       | 57                            |   |                          |                  |

<sup>a</sup> Several respondents included fisheries management activities in their responses. These were not included in this table.

<sup>b</sup> Most outgrant leases were held by a state wildlife management agency.

<sup>c</sup> Usually in conjunction with project and/or state.

<sup>d</sup> Usually working under supervision of project or state.

<sup>e</sup> Consists most of 3 or more of above listed organizations managing jointly.

Table 27. Utilization of prescribed burning on Corps projects (Q24a and 24b).

| Where Used (Q24a)     |                               | Purpose (Q24b)               |                               |
|-----------------------|-------------------------------|------------------------------|-------------------------------|
| Habitat               | No.<br>Projects<br>Responding | Response                     | No.<br>Projects<br>Responding |
| Openland <sup>a</sup> | 31                            | Wildlife habitat management  | 30                            |
| Hardwood forest       | 9                             | Grassland maintenance        | 26                            |
| Coniferous forest     | 8                             | Native prairie restoration   | 18                            |
| Wetland               | 7                             | Wildfire hazard reduction    | 16                            |
| Others                |                               | Forest understory management | 16                            |
| Prairie               | 1                             | Forest site preparation      | 8                             |
| Mixed forest          | 1                             | Marsh/wetland management     | 7                             |
| Dam/levee             | 1                             | Vector control               | 1                             |
| Unspecified           | 1                             | Others                       |                               |
|                       | —                             | Flood control                | 1                             |
|                       |                               | Control dam vegetation       | 1                             |
| Total Projects        | 36                            | Total Projects               | —                             |
|                       |                               |                              | 38                            |

<sup>a</sup> Includes rangeland, forest openings and other types of grasslands.



Table 29. A summary of wildlife recruitment surveys on Corps projects (Q44c).

| Recruitment Survey Method |                            | Taxa Surveyed              |                            | Frequency of Survey |                            | Participating Agency             |                            |
|---------------------------|----------------------------|----------------------------|----------------------------|---------------------|----------------------------|----------------------------------|----------------------------|
| Method                    | No. Responses <sup>a</sup> | Taxa                       | No. Responses <sup>a</sup> | Interval            | No. Responses <sup>a</sup> | Agency                           | No. Responses <sup>a</sup> |
| Nest counts/success       | 35                         | Birds                      |                            | Annually            | 79                         | Project alone                    | 34                         |
| Nest box survey           | 29                         | Wood duck                  | 21                         | Every 2-5 yrs       | 3                          | State alone                      | 22                         |
| Brood count               | 13                         | Eastern/western bluebird   | 19                         | Every 6+ yrs        | 1                          | Both above                       | 5                          |
| Use inventory             | 4                          | Bald/golden eagle          | 7                          |                     | —                          | Volunteer alone                  | 4                          |
| Breeding success          | 1                          | Canada geese/geese         | 7                          | Total Responses     | 83                         | Volunteer supported <sup>b</sup> | 4                          |
| Hunter success            | 1                          | Waterfowl                  | 6                          |                     |                            |                                  | —                          |
| Banding                   | 1                          | Osprey                     | 5                          |                     |                            | Total Responses                  | 69                         |
| Winter population         | 1                          | Songbird/neotropical birds | 2                          |                     |                            |                                  |                            |
| Tracking                  | 1                          | Turkey                     | 2                          |                     |                            |                                  |                            |
|                           | —                          | Kestrel                    | 2                          |                     |                            |                                  |                            |
| Total Responses           | 86                         | Purple martin              | 1                          |                     |                            |                                  |                            |
|                           |                            | Woodcock                   | 1                          |                     |                            |                                  |                            |
|                           |                            | Chukar                     | 1                          |                     |                            |                                  |                            |
|                           |                            | Common barn owl            | 1                          |                     |                            |                                  |                            |
|                           |                            | Great blue heron           | 1                          |                     |                            |                                  |                            |
|                           |                            | Hungarian partridge        | 1                          |                     |                            |                                  |                            |
|                           |                            | Interior least tern        | 1                          |                     |                            |                                  |                            |
|                           |                            | Peregrine falcon           | 1                          |                     |                            |                                  |                            |
|                           |                            | Piping plover              | 1                          |                     |                            |                                  |                            |
|                           |                            | Quail                      | 1                          |                     |                            |                                  |                            |
|                           |                            |                            | —                          |                     |                            |                                  |                            |
|                           |                            | Others                     | 81                         |                     |                            |                                  |                            |
|                           |                            | Squirrel                   | 2                          |                     |                            |                                  |                            |
|                           |                            | Raccoon                    | 1                          |                     |                            |                                  |                            |
|                           |                            | Ornate box turtle          | 1                          |                     |                            |                                  |                            |
|                           |                            | Upland game                | 1                          |                     |                            |                                  |                            |
|                           |                            |                            | —                          |                     |                            |                                  |                            |
|                           |                            |                            | 5                          |                     |                            |                                  |                            |
|                           |                            | Total Responses            | 86                         |                     |                            |                                  |                            |

<sup>a</sup> Thirty-five of 62 projects surveyed reported at least one annual or periodic recruitment survey.

<sup>b</sup> Indicates recruitment surveys in which volunteers worked concomitantly with responsible personnel from Corps of Engineers.



Table 31. Use of models for terrestrial habitat assessment and monitoring on surveyed projects (Q45 and Q46).

| Summary of Habitat Suitability Models (HSI) In Use (Q45) |              |               |                                |               |                    |                |                    |               |  |
|--|--------------|---------------|--------------------------------|---------------|--------------------|----------------|--------------------|---------------|--|
| Models In Use (Q46)                                      |              |               | Source of Model                |               |                    | Target Species |                    |               |  |
| Type   | No. Projects | No. Responses | Source                         | No. Responses | Species            | No. Responses  | Species            | No. Responses |  |
| HSI <sup>a</sup>   | 6            | 11            | Modified Bluebook <sup>c</sup> | 11            | Birds              | (Continued)    |                    |               |  |
| WHAG <sup>b</sup>  | 2            | 8             | Bluebook <sup>c</sup>          | 8             | California quail   | 2              | Mammals            |               |  |
| Deer mgmt. model   | 1            | 4             | Custom                         | 4             | Downy woodpecker   | 2              | Black-tailed deer  | 1             |  |
| Unidentified model                                       | 1            | 1             | Unspecified                    | 1             | Mallard            | 2              | Deer-unspecified   | 1             |  |
|  | —            | —             |                                | —             | Yellow warbler     | 2              | Mule deer          | 1             |  |
| Total Projects   | 10           | 24            | Total Projects                 | 24            | Barred owl         | 1              | River otter        | 1             |  |
|  |              |               |                                |               | Canada goose       | 1              | Rocky Mountain elk | 1             |  |
|  |              |               |                                |               | Chukar             | 1              |                    | —             |  |
|  |              |               |                                |               | Marsh wren         | 1              |                    | 5             |  |
|  |              |               |                                |               | Pheasant           | 1              |                    |               |  |
|  |              |               |                                |               | Song sparrow       | 1              | Unspecified Others | 11            |  |
|  |              |               |                                |               | Spotted owl        | 1              |                    |               |  |
|  |              |               |                                |               | Western meadowlark | 1              |                    | —             |  |
|  |              |               |                                |               | Wood duck          | 1              | Total Projects     | 32            |  |
|  |              |               |                                |               |                    | —              |                    |               |  |
|  |              |               |                                |               |                    | 17             |                    |               |  |

<sup>a</sup> Habitat Suitability Index

<sup>b</sup> Wildlife Habitat Appraisal Guide

<sup>c</sup> Refers to HSI species models published by the US Fish and Wildlife Service.

Table 32. Most important game species hunted on Corps projects (a42).

| Taxa              | No. Responses <sup>a</sup> | Importance<br>(1 - 10 scale) |     |      | Species Reported (No. Projects)  |
|-------------------|----------------------------|------------------------------|-----|------|--|
|                   |                            | Min                          | Max | Mean |  |
| Waterfowl         | 27                         | 1                            | 10  | 6.7  | waterfowl (16), ducks (4), mallard (2), geese (2), Canada goose (1), wood duck (1), teal (1)     |
| Upland Game Birds |                            |                              |     |      |  |
| Turkey            | 37                         | 2                            | 10  | 6.2  | turkey (30), wild turkey (5), eastern turkey (1), Rio Grande turkey (1)                          |
| Quail/Partridge   | 28                         | 1                            | 9   | 4.6  | quail (14) bobwhite (6), chukar (3) California quail (3), Hungarian partridge (1), partridge (1) |
| Pheasant          | 17                         | 5                            | 9   | 7.4  | pheasant (12), ring-necked pheasant (5)  |
| Grouse            | 11                         | 1                            | 7   | 3.6  | grouse (6), ruffed grouse (4), greater prairie chicken (1)                                       |
| Dove              | 7                          | 3                            | 10  | 6.4  | dove (5), mourning dove (2)  |
| Woodcock          | 4                          | 3                            | 9   | 5.3  | woodcock (4)   |
| Big Game          |                            |                              |     |      |  |
| Deer              | 55                         | 1                            | 10  | 6.1  | deer (27), white-tailed deer (22), mule deer (4), black-tailed deer (2)                          |
| Bear              | 3                          | 1                            | 8   | 3.3  | bear (2), black bear (1)   |
| Elk               | 2                          | 1                            | 3   | 2.0  | Rocky Mountain elk (1), Roosevelt elk (1)  |
| Cougar            | 2                          | 1                            | 1   | 1.0  | cougar (2)   |
| Small Game        |                            |                              |     |      |  |
| Rabbit            | 32                         | 1                            | 10  | 5.5  | rabbit (24), cottontail rabbit (4), eastern cottontail (2), swamp rabbit (2)                     |
| Squirrel          | 27                         | 2                            | 10  | 6.1  | squirrel (18), gray squirrel (5), fox squirrel (2), red squirrel (2)                             |
| Unspecified       | 2                          | 4                            | 5   | 4.5  | small game (2)   |
| Others            |                            |                              |     |      |  |
| Furbearers        | 4                          | 2                            | 5   | 3.8  | furbearers (4)   |
| Raccoon           | 3                          | 1                            | 10  | 6.0  | raccoon (3)  |
| Feral hog         | 2                          | 8                            | 9   | 8.5  | pig (2)  |
| Unspecified       | 2                          | 3                            | 6   | 4.5  | upland (1), upland game (1)  |

<sup>a</sup> Fifty-five responding projects gave 265 total responses. Respondents were asked to list and rate the importance of (up to) the 5 most important species hunted on their project; individual projects provided from 0 to 9 species, most listed 5.

Table 33. A summary of hunter harvest surveys performed on Corps projects (Q44d).

| Harvest Survey Method      |                               | Species/Taxa Surveyed |                               | Frequency of Survey |                               | Participating Agency |                               |
|----------------------------|-------------------------------|-----------------------|-------------------------------|---------------------|-------------------------------|----------------------|-------------------------------|
| Method                     | No.<br>Responses <sup>a</sup> | Taxa                  | No.<br>Responses <sup>a</sup> | Interval            | No.<br>Responses <sup>a</sup> | Agency               | No.<br>Responses <sup>a</sup> |
| Check station <sup>b</sup> | 19                            | Deer                  | 21                            | Annually            | 53                            | State                | 38                            |
| Mail survey <sup>c</sup>   | 10                            | Turkey                | 9                             | Every 2-5 yrs       | 3                             | Corps Project        | 7                             |
| Field/bag check            | 9                             | All <sup>e</sup>      | 6                             | Every 6+ yrs        | 0                             | Both Of Above        | 1                             |
| Harvest card               | 1                             | Waterfowl             | 4                             |                     | —                             | USFWS <sup>f</sup>   | 3                             |
| Windshield survey          | 1                             | Furbearers            | 3                             | Total Responses     | 56                            |                      | —                             |
| Quota hunt                 | 1                             | Bear                  | 2                             |                     |                               |                      | 49                            |
| Others <sup>d</sup>        |                               | Big game              | 2                             |                     |                               |                      |                               |
| Volunteers                 | 3                             | Upland game           | 2                             |                     |                               |                      |                               |
| Hunter success             | 3                             | Beaver                | 1                             |                     |                               |                      |                               |
| Harvest survey             | 2                             | Elk                   | 1                             |                     |                               |                      |                               |
| Hunter survey              | 2                             | Fox                   | 1                             |                     |                               |                      |                               |
| Trapper report             | 1                             | Rabbit                | 1                             |                     |                               |                      |                               |
| Post-season survey         | 1                             | Squirrel              | 1                             |                     |                               |                      |                               |
|                            | —                             | Pheasant              | 1                             |                     |                               |                      |                               |
| Total Responses            | 54                            | Canada geese          | 1                             |                     |                               |                      |                               |
|                            |                               | Total Responses       | 56                            |                     |                               |                      |                               |

<sup>a</sup> Twenty-five of 62 surveyed projects reported one or more harvest surveys each.

<sup>b</sup> Does not distinguish between manned and unmanned (voluntary survey) check stations.

<sup>c</sup> Does not distinguish a scientific mail survey of licensed/permitted hunters and a less formal mail-back of harvest cards distributed to hunters at permit stations or in the field.

<sup>d</sup> Survey method not identifiable.

<sup>e</sup> Indicates that all hunted species are included in harvest survey(s).

<sup>f</sup> US Fish and Wildlife Service.



Table 34. Animal damage control efforts on Corps projects (Q41).

| Selected Animal Damage Control Measures |              |                          |               | Species/Taxa of Nuisance Animals Reported |               |                    |               |
|---|--------------|--------------------------|---------------|---|---------------|--------------------|---------------|
| Animal Control Measures                 | No. Projects | Trend Over Next 10 Years |               | Taxa                                      | No. Responses | Taxa               | No. Responses |
|   |              | Decrease                 | Same Increase |   |               |                    |               |
| Nuisance wildlife control               | 30           | 1                        | 12            | Mammals                                   |               | (Continued)        |               |
| Feral dog/cat control                   | 19           | 1                        | 8             | Nuisance dog/cat                          | 19            | Waterfowl          |               |
| Population reduction hunts              | 11           | 0                        | 6             | Beaver                                    | 15            | Geese/Canada geese | 11            |
| Predator control                        | 7            | 0                        | 3             | Deer                                      | 10            | Waterfowl          | 2             |
|   | —            |                          | 4             | Raccoon                                   | 4             | Domestic waterfowl | 1             |
|   |              |                          |               | Coyote                                    | 3             | Ducks              | 1             |
|   |              |                          |               | Feral hog                                 | 2             | Mute swan          | 1             |
|   |              |                          |               | Prairie dog                               | 2             |                    | —             |
|   |              |                          |               | Skunk                                     | 2             |                    | 16            |
|   |              |                          |               | Woodchuck                                 | 2             | Other Birds        |               |
|   |              |                          |               | Burrowing rodents                         | 1             | Turkey             | 2             |
|   |              |                          |               | California ground squirrel                | 1             | Ring-billed gull   | 1             |
|   |              |                          |               | Cougar                                    | 1             | Rock dove / pigeon | 2             |
|   |              |                          |               | Furbearers                                | 1             | Starling           | 1             |
|   |              |                          |               | Ground squirrel                           | 1             | Vulture            | 1             |
|   |              |                          |               | Mammals                                   | 1             |                    | —             |
|   |              |                          |               | Moles                                     | 1             |                    | 7             |
|   |              |                          |               | Yellow-bellied marmot                     | 1             | Other              |               |
|   |              |                          |               | Rabbit                                    | 1             | Upland game        | 1             |
|   |              |                          |               | Rats                                      | 1             |                    | —             |
| Total Projects Responding               | 42           |                          |               |   | 69            | Total Responses    | 93            |

<sup>a</sup> Most commonly listed species on the increase were beaver (9), geese (5), and raccoon (4).

Table 35. Project ratings of the significance of selected natural resources occurring on Corps projects (Q9).

| Natural Resource    | No. Projects Responding | Mean Significance <sup>a</sup> |          |
|---------------------|-------------------------|--------------------------------|----------|
|                     |                         | Local                          | Regional |
| Habitats            |                         |                                |          |
| aquatic areas       | 61                      | 7.9                            | 7.5      |
| riparian corridors  | 61                      | 6.9                            | 6.5      |
| wetland             | 60                      | 6.7                            | 6.5      |
| forestland          | 58                      | 6.4                            | 6.0      |
| openland            | 59                      | 5.2                            | 4.9      |
| scrub/shrub         | 59                      | 5.0                            | 4.7      |
| agricultural land   | 54                      | 4.0                            | 3.5      |
| native prairie      | 46                      | 3.2                            | 2.9      |
| Biota               |                         |                                |          |
| warmwater fishes    | 57                      | 8.2                            | 7.5      |
| upland game species | 61                      | 7.4                            | 6.5      |
| waterfowl           | 61                      | 6.9                            | 6.1      |
| nongame species     | 61                      | 6.5                            | 5.9      |
| T&E species         | 60                      | 5.7                            | 5.6      |
| coldwater fishes    | 54                      | 5.0                            | 4.9      |
| furbearers          | 60                      | 4.5                            | 3.9      |
| sensitive plants    | 57                      | 4.2                            | 3.9      |

<sup>a</sup> Assigned ratings ranged from 1 (least important) to 10 (most important).

Table 36. Importance of selected aquatic resource management concerns (Q48).

| Selected Concern           | Current Importance <sup>a</sup> |     |     |      | Importance During Next 10 Years <sup>a</sup> |     |     |      |
|----------------------------|---------------------------------|-----|-----|------|--|-----|-----|------|
|                            | No. Projects                    | Min | Max | Mean | No. Projects                                 | Min | Max | Mean |
|                            |                                 |     |     |      |  |     |     |      |
| Water quality              | 61                              | 1   | 10  | 7.6  | 56   | 3   | 10  | 8.4  |
| Condition of fishery       | 60                              | 1   | 10  | 7.6  | 56   | 1   | 10  | 8.0  |
| Pollution/contamination    | 61                              | 0   | 10  | 6.3  | 56   | 0   | 10  | 7.1  |
| Siltation/sedimentation    | 61                              | 0   | 10  | 6.3  | 55   | 1   | 10  | 5.4  |
| Shoreline erosion          | 60                              | 0   | 10  | 5.3  | 55   | 0   | 10  | 6.4  |
| User group conflicts       | 60                              | 0   | 10  | 4.4  | 57   | 0   | 10  | 5.9  |
| Boater crowding            | 60                              | 0   | 10  | 4.2  | 57   | 0   | 10  | 6.0  |
| Nuisance aquatic plants    | 59                              | 0   | 10  | 2.0  | 56   | 0   | 10  | 2.4  |
| Others                     |                                 |     |     |      |  |     |     |      |
| bank/channel issues        | 1                               | 10  | 10  | 10.0 | 1  | 10  | 10  | 10.0 |
| dredged material disposal  | 1                               | 10  | 10  | 10.0 | 1  | 10  | 10  | 10.0 |
| waterfowl/shoreline issues | 1                               | 8   | 8   | 8.0  | 1  | 8   | 8   | 8.0  |
| zebra mussels              | 2                               | 6   | 8   | 7.0  | 2  | 8   | 8   | 8.0  |
| water supply               | 1                               | 6   | 6   | 6.0  | 1  | 8   | 8   | 8.0  |

<sup>a</sup> Rating of importance ranged from 0 (not important) to 10 (very important).

Table 37. Importance of selected aquatic resource issues to project operations (Q49).

| Resource Issue            | No. Projects Responding | Importance <sup>a</sup> |     |      | Projects Indicating A Concern |           |                |             |
|---------------------------|-------------------------|-------------------------|-----|------|-------------------------------|-----------|----------------|-------------|
|                           |                         | Min                     | Max | Mean | No. Projects                  | Up-stream | Within Project | Down-stream |
|                           |                         |                         |     |      |                               |           |                |             |
| Water fluctuations        | 62                      | 0                       | 10  | 8.1  | 58                            | 17        | 51             | 37          |
| Fishery considerations    | 62                      | 0                       | 10  | 7.3  | 60                            | 15        | 56             | 39          |
| Water quality             | 62                      | 0                       | 10  | 6.7  | 57                            | 11        | 45             | 37          |
| Siltation                 | 62                      | 0                       | 10  | 5.9  | 60                            | 12        | 56             | 20          |
| Shoreline erosion         | 62                      | 0                       | 10  | 5.6  | 56                            | 7         | 50             | 22          |
| Resource use conflicts    | 62                      | 0                       | 10  | 5.6  | 58                            | 10        | 52             | 16          |
| Pollution/contamination   | 62                      | 0                       | 10  | 4.4  | 49                            | 11        | 38             | 24          |
| Others                    |                         |                         |     |      |                               |           |                |             |
| dredged material disposal | 1                       | 10                      | 10  | 10.0 | 1                             | 0         | 1              | 0           |
| water supply              | 3                       | 7                       | 10  | 9.0  | 3                             | 0         | 0              | 3           |
| water temperature         | 1                       | 8                       | 8   | 8.0  | 1                             | 0         | 0              | 1           |
| bank stabilization        | 1                       | 8                       | 8   | 8.0  | 1                             | 0         | 1              | 0           |

<sup>a</sup> Rating of importance ranged from 0 (not important) to 10 (very important).

Table 38. A summary of restrictions on project operations intended to accommodate recreation and natural resource concerns (Q50).

| Type Of Restriction Reason    | No. Projects Responding |
|-------------------------------|-------------------------|
| Minimum Release               |                         |
| fisheries                     | 16                      |
| water quality                 | 4                       |
| mussels                       | 2                       |
| water supply                  | 1                       |
| reason not specified          | 6                       |
|                               | —                       |
|                               | 24                      |
| Seasonal pool levels          |                         |
| fisheries                     | 6                       |
| recreation                    | 5                       |
| waterfowl                     | 3                       |
|                               | —                       |
|                               | 11                      |
| Maximum Release Rate          |                         |
| shoreline erosion             | 2                       |
| Reduced Hydropower Production |                         |
| fisheries                     | 1                       |
| Periodic Releases             |                         |
| rafters                       | 1                       |
| Total Projects Responding     | 34                      |

Table 39. Conflicts associated with use and management of aquatic resources (Q53).

| Nature of Conflict                          | No. Projects Responding | Severity <sup>a</sup> |     |      | No. Anticipating Change In Next 10 years |               |
|---|-------------------------|-----------------------|-----|------|--|---------------|
|   |                         | Min                   | Max | Mean | Decrease                                 | Same Increase |
| Recreation vs Recreation                    |                         |                       |     |      |  |               |
| fishers vs boaters                          | 22                      | 2                     | 10  | 5.3  | 0  | 8 13          |
| personal watercraft vs all others           | 18                      | 4                     | 10  | 6.7  | 0  | 0 18          |
| powered boats vs nonpowered boats           | 2                       | 7                     | 7   | 7.0  | 0  | 0 2           |
| miscellaneous others                        | 16                      | -                     | -   | -    | -  | -             |
|   | —                       |                       |     |      |  |               |
|   | 38                      |                       |     |      |  |               |
| Operations vs Natural Resource Management   |                         |                       |     |      |  |               |
| hydropower vs fisheries                     | 7                       | 5                     | 10  | 8.0  | 1  | 3 2           |
| flood control vs fisheries                  | 6                       | 5                     | 10  | 6.8  | 0  | 3 3           |
| water level management vs fisheries         | 2                       | 5                     | 10  | 7.5  | 0  | 2 0           |
| miscellaneous others                        | 11                      | -                     | -   | -    | -  | -             |
|   | —                       |                       |     |      |  |               |
|   | 15                      |                       |     |      |  |               |
| Operations vs Recreation                    |                         |                       |     |      |  |               |
| flood control vs recreation                 | 8                       | 3                     | 9   | 6.5  | 0  | 7 1           |
| commercial shipping vs recreational boaters | 3                       | 4                     | 4   | 4.0  | 0  | 1 2           |
| water level management vs recreation        | 2                       | 8                     | 10  | 9.0  | 0  | 1 1           |
| irrigation vs recreation                    | 2                       | 8                     | 8   | 8.0  | 0  | 0 2           |
| hydropower vs recreation                    | 2                       | 4                     | 6   | 5.0  | 0  | 1 1           |
| miscellaneous others                        | 3                       | -                     | -   | -    | -  | -             |
|   | —                       |                       |     |      |  |               |
|   | 15                      |                       |     |      |  |               |
|   | —                       |                       |     |      |  |               |
| Total Projects Responding                   | 47                      |                       |     |      |  |               |

<sup>a</sup> Severity based on a rating from 1 (low) to 10 (very high).

Table 40. Summary of water-related health advisories issued on Corps projects (054).

| Advisory       | No. Projects Responding | No. Projects with Advisories |               | Reason for Advisory   |                        |
|----------------|-------------------------|------------------------------|---------------|---|------------------------|
|                |                         | Ever Issued                  | Now In Effect | Cause   | No. Projects           |
| Eating fish    | 62                      | 17                           | 7             | heavy metals<br>dioxin<br>pesticides<br>others                                | 5<br>3<br>2<br>2       |
| Swimming       | 62                      | 24                           | 2             | coliform<br>biol. contaminants<br>medical waste<br>heavy metals<br>high water | 19<br>1<br>1<br>1<br>1 |
| Drinking water | 3                       | 3                            | 1             | coliform  | 3                      |
| Total Projects | 62                      | 35                           | 9             |   |                        |

Table 41. Trends in nuisance species of aquatic plants and animals reported by Corps projects (852).

| Nuisance Species           | No. Projects <sup>a</sup> | Trend Over Last 10 Years<br>(Number of Projects) |                 | Anticipated Trend In 10 Years<br>(Number of Projects) |                 |
|----------------------------|---------------------------|--|-----------------|---|-----------------|
|                            |                           | Decreasing                                       | Same Increasing | Decreasing  | Same Increasing |
| Animals                    |                           |  |                 |   |                 |
| Zebra mussels <sup>b</sup> | 7                         | 0  | 4               | 0   | 7               |
| Beaver                     | 4                         | 0  | 3               | 0   | 4               |
| Canada geese               | 2                         | 0  | 2               | 0   | 2               |
| Nutria                     | 1                         | 0  | 0               | 0   | 1               |
| Squawfish                  | 1                         | 0  | 1               | 0   | 1               |
| Common carp                | 1                         | 0  | 0               | 0   | 0               |
| Plants                     |                           |  |                 |   |                 |
| Eurasian watermilfoil      | 5                         | 0  | 3               | 0   | 3               |
| Hydrilla                   | 3                         | 0  | 2               | 0   | 3               |
| Purple loosestrife         | 3                         | 0  | 3               | 0   | 2               |
| Water celery               | 2                         | 0  | 2               | 0   | 2               |
| Water hyacinth             | 2                         | 0  | 2               | 0   | 2               |
| Algae                      | 1                         | 0  | 0               | 0   | 0               |
| Coontail                   | 1                         | 0  | 1               | 0   | 1               |
| Phragmites                 | 1                         | 0  | 1               | 0   | 0               |
|                            | —                         |  |                 |   |                 |
|                            | 24                        |  |                 |   |                 |

<sup>a</sup> Geographical note: 23 of 34 total responses were from NCD(9), SAD(8), and SWD(6).

<sup>b</sup> Geographical note: concerns about zebra mussels were reported by NCD(3), SWD(2), ORD(1) and LMVD(1).





Table 43. Participation of Corps projects in the collection and analysis of sport fishery management data (Q55e).

| Activity                          | No.<br>Projects<br>Responding | Responsible Agency<br>(Number of Projects) |       |      |       | Corps Funding<br>(No. Projects) |    | Corps Personnel<br>(No. Projects) |    |
|-----------------------------------|-------------------------------|--|-------|------|-------|---------------------------------|----|-----------------------------------|----|
|                                   |                               | Corps                                      | State | Both | Other | Yes                             | No | Yes                               | No |
| Stock assessment data collections | 43                            | 1  | 35    | 1    | 0     | 4                               | 39 | 9                                 | 33 |
| Catch data collections (creel)    | 40                            | 1  | 27    | 2    | 1     | 3                               | 36 | 6                                 | 33 |
| Data analysis                     | 38                            | 1  | 26    | 2    | 1     | 4                               | 33 | 5                                 | 32 |
|                                   | —                             |  |       |      |       | —                               |    | —                                 |    |
| Total Projects                    | 45                            |  |       |      |       | 8                               |    | 14                                |    |

Table 44. Acreages of wetlands on Corps projects (Q71).

| Acreage          | No. Projects Reporting |                         |                 |
|------------------|------------------------|-------------------------|-----------------|
|                  | Natural<br>Wetlands    | Constructed<br>Wetlands | All<br>Wetlands |
| 1 - 10           | 14                     | 8                       | 12              |
| 11 - 100         | 9                      | 8                       | 12              |
| 101 - 1,000      | 12                     | 9                       | 14              |
| 1,001 - 10,000   | 8                      | 0                       | 8               |
| 10,001 - 100,000 | 2                      | 1                       | 3               |
| undetermined     | 1                      | 0                       | 1               |
|                  | —                      | —                       | —               |
| Total Projects   | 46                     | 26                      | 50              |
| Mean Acreage     | 2,499                  | 679                     | 2,655           |

Table 45. Availability and status of wetland inventories on Corps projects (Q72, Q73, and Q74).

| Availability of a<br>Wetland Inventory (Q72) |                               | Degree of Completion (Q74) |           |                    | Thoroughness of Inventory (Q73)     |                               |
|--|-------------------------------|----------------------------|-----------|--------------------|-------------------------------------|-------------------------------|
| Response                                     | No.<br>Projects<br>Responding | No. of Projects            |           |                    | Response                            | No.<br>Projects<br>Responding |
|  |                               | Percent<br>Completion      | Presently | In Next<br>5 Years |                                     |                               |
| No   | 41                            | 0                          | 6         | 5                  | Thorough in all wetlands            | 4                             |
| Yes  | 20                            | 1- 20                      | 4         | 3                  | Thorough in selected wetlands.      | 1                             |
|  | —                             | 21- 40                     | 0         | 0                  | Cursory surveys only                | 14                            |
| Total Projects                               | 61                            | 41- 60                     | 6         | 4                  | Details of available survey unknown | 1                             |
|  |                               | 61- 80                     | 2         | 4                  |                                     | —                             |
|  |                               | 81-100                     | 12        | 14                 | Total Projects Responding           | 20                            |
|  |                               | Total                      | 30        | 30                 |                                     |                               |

Table 46. Classification methods (Q75) and personnel (Q76) used in wetland inventories on Corps projects.

| Wetland Classification Methods Used (Q75)  |                 | Inventory Personnel (Q76) |                            | Use of a Certified Wetland Delineator (Q76) |                         |
|--|-----------------|---------------------------|----------------------------|---|-------------------------|
| Method                                     | No. Responses   | Affiliation               | No. Responses <sup>e</sup> | Response                                    | No. Projects Responding |
| Informal methods                           | 12              | USFWS <sup>f</sup>        | 18                         | No  | 7                       |
| National Wetland Inventory <sup>a</sup>    | 10              | Corps Project             | 16                         | Yes   | 5                       |
| CE Wetland Delineation Manual <sup>b</sup> | 5               | Corps District            | 14                         | Don't Know                                  | 10                      |
| Shaw and Fredine (1956)                    | 0               | State                     | 12                         |   | —                       |
| Others                                     | 3 <sup>c</sup>  | WES                       | 6                          | Total Projects                              | 22                      |
|  | —               | Others                    | 3                          |   |                         |
| Total Responses                            | 28 <sup>d</sup> | Total Responses           | 69                         |   |                         |

<sup>a</sup> Cowardin et al. (1979).

<sup>b</sup> Environmental Laboratory (1987).

<sup>c</sup> Surveys conducted by other agencies using unknown methods

<sup>d</sup> Some projects reported using more than one method

<sup>e</sup> Several wetland inventory efforts involved personnel from 2 or more agencies.

<sup>f</sup> Includes USGS National Biological Service (NBS) and USGS Biological Resources Division (BRD).

Table 47. Perceived importance of selected wetland management objectives (Q78) and practices (Q80) on Corps projects.

| Selected Management Objectives | Wetland Management Objectives (Q78) |                    |     |      |                   |     |      | Wetland Management Practices (Q80) |                         |            |     |      |
|--------------------------------|-------------------------------------|--------------------|-----|------|-------------------|-----|------|------------------------------------|-------------------------|------------|-----|------|
|                                | No. Projects Responding             | Present Importance |     |      | Future Importance |     |      | Potential Management Practices     | No. Projects Responding | Importance |     |      |
|                                |                                     | Min                | Max | Mean | Min               | Max | Mean |                                    |                         | Min        | Max | Mean |
|                                |                                     |                    |     |      |                   |     |      |                                    |                         |            |     |      |
| Waterfowl                      | 50                                  | 0                  | 10  | 6.5  | 0                 | 10  | 7.0  | Nesting structures                 | 50                      | 0          | 10  | 5.3  |
| Biodiversity                   | 50                                  | 0                  | 10  | 5.3  | 0                 | 10  | 6.1  | Vegetation management              | 44                      | 0          | 10  | 4.9  |
| Nongame wildlife               | 50                                  | 0                  | 10  | 5.0  | 0                 | 10  | 5.8  | Moist soil management              | 44                      | 0          | 10  | 4.0  |
| T&E species                    | 49                                  | 0                  | 10  | 4.2  | 0                 | 10  | 5.0  | Reservoir water levels             | 45                      | 0          | 10  | 3.9  |
| Furbearers                     | 50                                  | 0                  | 10  | 4.2  | 0                 | 10  | 4.5  | Agricultural food plots            | 46                      | 0          | 10  | 3.6  |
| Fish spawning                  | 50                                  | 0                  | 10  | 3.6  | 0                 | 10  | 4.3  | Beaver pond management             | 46                      | 0          | 10  | 2.9  |
| Buffer zones                   | 50                                  | 0                  | 10  | 3.3  | 0                 | 10  | 4.0  | Buffer zone management             | 43                      | 0          | 10  | 2.8  |
| Vector control                 | 50                                  | 0                  | 10  | 1.7  | 0                 | 10  | 1.8  | Greentree reservoirs               | 41                      | 0          | 10  | 2.5  |
| Wastewater treatment           | 50                                  | 0                  | 10  | 1.1  | 0                 | 10  | 1.6  | Artificial potholes                | 44                      | 0          | 10  | 2.5  |
|                                |                                     |                    |     |      |                   |     |      | Prescribed burning                 | 41                      | 0          | 10  | 2.1  |

Table 48. Summary of wetland types and target species or groups featured in wetland management programs on Corps projects (Q79).

| Featured Wetlands        |                              | Featured Taxa or Species |                              |
|--------------------------|------------------------------|--------------------------|------------------------------|
| Wetland Type             | No.<br>Projects<br>Reporting | Taxa/Species             | No.<br>Projects<br>Reporting |
| Freshwater marsh         | 20                           | Birds                    |                              |
| Beaver pond              | 19                           | wood duck                | 26                           |
| Riparian areas           | 9                            | waterfowl                | 23                           |
| Moist soil areas         | 6                            | Canada goose             | 8                            |
| Ponds                    | 6                            | mallard                  | 5                            |
| Bottomland hardwoods     | 5                            | shorebirds               | 3                            |
| Potholes                 | 5                            | dabbling ducks           | 2                            |
| Slough                   | 3                            | geese                    | 2                            |
| Reservoir margin         | 2                            | songbirds                | 2                            |
| Greentree reservoir      | 2                            | bald eagle               | 2                            |
| Flooded agriculture      | 1                            | herons                   | 1                            |
| Mudflat                  | 1                            | snow goose               | 1                            |
| Reservoir                | 1                            | swans                    | 1                            |
| Salt marsh               | 1                            | pelican                  | 1                            |
| Seasonally flooded areas | 1                            | hooded merganser         | 1                            |
| Swamp                    | 1                            | teal                     | 1                            |
|                          |                              | black duck               | 1                            |
|                          |                              | coot                     | 1                            |
|                          |                              | egrets                   | 1                            |
|                          |                              | woodcock                 | 1                            |
|                          |                              | snipe                    | 1                            |
|                          |                              | red-winged blackbird     | 1                            |
|                          |                              | pheasant                 | 1                            |
|                          |                              | neotropical birds        | 1                            |
|                          |                              | prothonotary warbler     | 1                            |
|                          |                              | quail                    | 1                            |
|                          |                              | red-shouldered hawk      | 1                            |
|                          |                              | Mammals                  |                              |
|                          |                              | beaver                   | 5                            |
|                          |                              | furbearers               | 4                            |
|                          |                              | muskrat                  | 4                            |
|                          |                              | river otter              | 3                            |
|                          |                              | nongame animals          | 3                            |
|                          |                              | bats                     | 1                            |
|                          |                              | mink                     | 1                            |
|                          |                              | fox                      | 1                            |
|                          |                              | Fishes                   |                              |
|                          |                              | fish                     | 2                            |
|                          |                              | brown trout              | 1                            |
|                          |                              | brook trout              | 1                            |
|                          |                              | rainbow trout            | 1                            |
|                          |                              | Reptiles                 |                              |
|                          |                              | snapping turtle          | 2                            |
|                          |                              | painted turtle           | 1                            |
|                          |                              | Amphibians               |                              |
|                          |                              | four-toed salamander     | 1                            |
|                          |                              | bullfrog                 | 1                            |
|                          |                              | grass frog               | 1                            |
|                          |                              | green frog               | 1                            |

Table 49. Trends concerning the infestation of project wetlands with nuisance plants and animals (Q82).

| Wetland<br>Nuisance<br>Species | No.<br>Projects<br>Responding | Trend In Last 10 Years<br>(No. of Projects) |      |          | Trend In Next 10 Years<br>(No. of Projects) |      |          |
|--------------------------------|-------------------------------|---|------|----------|---|------|----------|
|                                |                               | Decrease                                    | Same | Increase | Decrease                                    | Same | Increase |
| Animals                        |                               |   |      |          |   |      |          |
| beaver                         | 4                             | 0   | 1    | 3        | 0   | 1    | 3        |
| Canada goose                   | 3                             | 0   | 0    | 3        | 0   | 1    | 2        |
| nutria                         | 1                             | 0   | 1    | 0        | 0   | 0    | 1        |
| zebra mussel                   | 1                             | 0   | 0    | 1        | 0   | 0    | 1        |
| Plants                         |                               |   |      |          |   |      |          |
| purple loosestrife             | 5                             | 0   | 0    | 3        | 0   | 0    | 4        |
| cocklebur                      | 2                             | 0   | 2    | 0        | 1   | 1    | 0        |
| bulrush                        | 1                             | 0   | 1    | 0        | 0   | 1    | 0        |
| cattail                        | 1                             | 0   | 0    | 1        | 0   | 0    | 1        |
| daphnia                        | 1                             | 0   | 0    | 1        | 0   | 0    | 1        |
| duckweed                       | 1                             | 1   | 0    | 0        | 1   | 0    | 0        |
| phragmites                     | 1                             | 0   | 0    | 1        | 0   | 0    | 1        |
| thistle                        | 1                             | 0   | 1    | 0        | 0   | 1    | 0        |
| waterhyacinth                  | 1                             | 0   | 1    | 0        | 0   | 1    | 0        |
| willow                         | 1                             | 0   | 1    | 0        | 1   | 0    | 0        |
| Total Projects                 |                               | 19  |      |          |   |      |          |



Table 50. Anticipated land use changes along project boundaries that may affect project wetlands during the next 10 years (Q83).

| Changes Along Property Boundaries |                         | Effect on Project Wetlands |                         |
|-----------------------------------|-------------------------|----------------------------|-------------------------|
| Description                       | No. Projects Responding | Description                | No. Projects Responding |
| Urban/housing development         | 14                      | Increased siltation        | 12                      |
| Logging                           | 4                       | Increased pollution        | 3                       |
| More/changing agriculture         | 4                       | Reduced water quality      | 3                       |
| Channelization                    | 1                       | Increase in runoff water   | 3                       |
| Increased erosion                 | 1                       | Wetland encroachment       | 2                       |
| Grazing practices                 | 1                       | Habitat changes            | 2                       |
| Industrial discharge              | 1                       | Improved wetland buffer    | 1                       |
| Mining                            | 1                       | Wetland destruction        | 1                       |
| Less agriculture                  | 1                       | Reduction in runoff water  | 1                       |
|                                   | —                       |                            | —                       |
|                                   | 20                      |                            | 20                      |

Table 51. Species reported by project personnel as Federally listed threatened, endangered, and candidate species occurring on surveyed projects.

| Federally Listed Threatened and Endangered Species <sup>a</sup> (Q59a) |                              |                               |                              | Federal Candidate Species <sup>a</sup> (Q59b) |                              |                                 |                              |
|--|------------------------------|-------------------------------|------------------------------|---|------------------------------|---------------------------------|------------------------------|
| Taxa   | No.<br>Projects <sup>b</sup> | Taxa                          | No.<br>Projects <sup>b</sup> | Taxa  | No.<br>Projects <sup>b</sup> | Taxa                            | No.<br>Projects <sup>b</sup> |
| Birds  |                              | (Continued)                   |                              | Birds   |                              | (Continued)                     |                              |
| Bald eagle   | 38                           | Invertebrates                 |                              | Bald eagle                                    | 1                            | Reptiles/Amphibians             |                              |
| California condor  | 1                            | Higgins' eye pearlymussel     | 2                            | Black-shouldered                              |                              | Foothills yellow-               |                              |
| Eagle (unspecified)  | 1                            | Brookfloater mussel           | 1                            | kite  | 1                            | legged frog                     | 1                            |
| Golden eagle   | 1                            | Rough pigtoe                  | 1                            | Burrowing owl                                 | 1                            | Red-legged frog                 | 1                            |
| Interior least tern  | 2                            | Cumberland bean pearlymussel  | 1                            | Cooper's hawk                                 | 1                            | Southwestern pond               |                              |
| Least tern   | 2                            | Heavy pigtoe                  | 1                            | Double-crested                                |                              | turtle                          | 1                            |
| Northern spotted owl   | 1                            | Dromedary pearlymussel        | 1                            | cormorant                                     | 1                            | Texas horned lizard             | 1                            |
| Osprey   | 2                            | Eastern pearly shelled mussel | 1                            | Marsh hawk                                    | 1                            |                                 |                              |
| Peregrine falcon   | 7                            | Green-blossom pearlymussel    | 1                            | Red-shouldered                                |                              |                                 | 3                            |
| Piping plover  | 3                            | Orange-foot pimple back       |                              | hawk  | 1                            | Plants                          |                              |
| Whooping crane   | 2                            | pearlymussel                  | 1                            | White pelican                                 | 1                            | Short's bladderpod              | 1                            |
|  | —                            | Purple cat's paw pearlymussel | 1                            |   | —                            | Snuffbox                        | 1                            |
|  | 43                           | White wartyback pearlymussel  | 1                            |   | 4                            | Spectaclecase                   | 1                            |
| Fish   |                              | Yellow blossom pearlymussel   | 1                            | Fish  |                              | Spiny-sepaled coyote            |                              |
| Chinook salmon   | 2                            | Pink mucket pearlymussel      | 1                            | Alabama sturgeon                              | 1                            | thistle                         | 1                            |
| Fall chinook salmon  | 1                            | Cumberlandian combshell       | 1                            | Blue shiner                                   | 1                            | Svenson's wild rye              | 1                            |
| Sockeye salmon   | 1                            | Southern combshell            | 1                            | Bull trout                                    | 4                            | Water stitchwort                | 1                            |
| Goldline darter  | 1                            | Black chubshell               | 1                            | Chinook salmon                                | 2                            | Harper's umbrella               |                              |
| Leopard darter   | 1                            | American burying beetle       | 1                            | Crystal darter                                | 1                            | plant                           | 1                            |
| Neosho madtom  | 1                            |                               | —                            | Dirty darter                                  | 1                            | Mohlenbrocks umbrella           |                              |
| Roanoke logperch   | 1                            |                               | 7                            | Blue sucker                                   | 1                            | plant                           | 1                            |
| Snake River sockeye  |                              | Mammals                       |                              | Paddlefish <sup>c</sup>                       | 1                            | Shaved sedge                    | 1                            |
| salmon   | 1                            | Northern monk seal            | 1                            | Pallid sturgeon <sup>d</sup>                  | 1                            |                                 | —                            |
|  | —                            | Gray bat                      | 1                            | Wild steelhead                                | 1                            |                                 | 3                            |
|  | 6                            | Indiana bat                   | 1                            |   | —                            | Invertebrates                   |                              |
| Plants   |                              | Nelsons antelope              | 1                            |   | 8                            | Armored rocksnail               | 1                            |
| Yellow lady's  |                              | Ground squirrel               | 1                            | Mammals                                       |                              | Holestan blister                |                              |
| slipper  | 1                            |                               | —                            | Eastern woodrat                               | 1                            | beetle                          | 1                            |
| Bay star vine  | 1                            |                               | 3                            | Indiana bat                                   | 1                            | Muddy rocksnail                 | 1                            |
| Kaweah brodiaea  | 1                            | Reptiles/Amphibians           |                              | Kangaroo rat                                  | 1                            | Ornate rocksnail                | 2                            |
| California Valley  |                              | Red Hills salamander          | 1                            |   | —                            | Southern chubshell <sup>e</sup> | 1                            |
| elderberry   | 1                            | American alligator            | 1                            |   | 3                            | Pugnose rocksnail               | 1                            |
| Hoods milkweed   | 1                            | Ornate box turtle             | 1                            |   |                              |                                 | —                            |
| Pink lady's slipper  | 1                            |                               | —                            |   |                              |                                 | 3                            |
| Price's potato bean  | 1                            |                               | 3                            |   |                              |                                 |                              |
| Western wall flower  | 1                            |                               |                              |   |                              |                                 |                              |
| Winged mapleleaf   | 1                            |                               |                              |   |                              |                                 |                              |
| <u>Aster vialis</u>  | 1                            |                               |                              |   |                              |                                 |                              |
|  | —                            |                               |                              |   |                              |                                 |                              |
|  | 6                            |                               |                              |   |                              |                                 |                              |

<sup>a</sup> Some of these species are not Federally listed, but for reporting purposes are included as reported by respondents.

<sup>b</sup> A total of 45 projects listed one more threatened or endangered species; 12 listed one or more candidate species,.

<sup>c</sup> Reported by project as Polydon spathula.

<sup>d</sup> Reported by project as Scaphirhynchus spp.

<sup>e</sup> Reported by project as Pleurobema decisum.

Table 52. Progress in conducting inventories on Corps projects for Federally listed threatened and endangered species projects (Q57, Q58b, and Q58d).

| Initiation of Species Inventories (Q57) |                         | Overall Completion (Q58d) |                 |                  | Inventory Participants (Q58a)     |                         |
|---|-------------------------|---------------------------|-----------------|------------------|-----------------------------------|-------------------------|
| Response                                | No. Projects Responding | Percent Completion        | No. of Projects |                  | Organizations                     | No. Projects Responding |
|   |                         |                           | Presently       | In Next 10 Years |                                   |                         |
| Yes                                     | 37                      | 1- 20                     | 10              | 5                | State agency                      | 28                      |
| No                                      | 24                      | 21- 40                    | 4               | 4                | U.S. Fish and Wildlife Service    | 20                      |
|   | —                       | 41- 60                    | 3               | 5                | Corps project personnel           | 16                      |
| Total                                   | 61                      | 61- 80                    | 5               | 4                | Corps division/district personnel | 12                      |
|   |                         | 81-100                    | 8               | 12               | University                        | 12                      |
|   |                         | Total                     | —               | —                | Private Consultant                | 10                      |
|   |                         |                           | 30              | 30               | The Nature Conservancy            | 4                       |
|   |                         |                           |                 |                  |                                   |                         |
|   |                         |                           |                 |                  | National Marine Fisheries Service | 1                       |
|   |                         |                           |                 |                  | Miscellaneous others              | 5                       |
|   |                         |                           |                 |                  | Total Projects Responding         | 39                      |

Table 53. Thoroughness of inventories that have been conducted for threatened and endangered species on Corps projects (Q58b and 58c).

| Overall Thoroughness of Inventories (Q58b) |                         | Inventories by Major Taxa- No. of Projects (Q58c) |                         |         |                  |                   |
|--|-------------------------|---|-------------------------|---------|------------------|-------------------|
| Response                                   | No. Projects Responding | Taxa <sup>a</sup>                                 | No. Projects Responding | Species |                  | Candidate Species |
|  |                         |   |                         | Some    | Partial Complete |                   |
| Comprehensive inventory of all species     | 10                      | Birds   | 35                      | 20      | 15               | 23                |
| Thorough inventory of selected species     | 15                      | Fish  | 24                      | 14      | 9                | 16                |
| Cursory Inventory                          | 16                      | Mammals   | 18                      | 11      | 7                | 12                |
|  | —                       | Invertebrates                                     | 22                      | 14      | 7                | 11                |
|  | 41                      | Plants  | 21                      | 12      | 9                | 15                |
|  |                         | Reptiles/Amphibians                               | 19                      | 13      | 6                | 12                |
|  |                         | State-listed species                              | 23                      | 14      | 9                | 16                |
|  |                         | Total Projects                                    | 42                      |         |                  | 32                |

<sup>a</sup> Refers to federally listed taxa unless otherwise indicated.

Table 54. Status of inventory and management efforts on Corps projects directed at critical habitats of federally listed threatened and endangered species (Q58c and Q63).

| Inventories of Critical Habitats (Q58c) |                         |                            |                         | Management of Critical Habitats <sup>a</sup> (Q63) |                         |   |                         |
|---|-------------------------|----------------------------|-------------------------|--|-------------------------|---|-------------------------|
| Conducted on Project                    |                         | General Status             |                         | Effort Directed at Critical Habitats               |                         | Species For Which Critical Habitats Are Managed |                         |
| Response                                | No. Projects Responding | Condition                  | No. Projects Responding | Response   | No. Projects Responding | Taxa  | No. Projects Responding |
| Yes                                     | 22                      |                            |                         | Some   | 17                      | Birds   |                         |
| No                                      | 39                      | Include all species        | 12                      | None   | 44                      | Bald eagle                                      | 5                       |
|   | —                       | Include some species       | 10                      |  | —                       | Indiana bat                                     | 3                       |
| Total                                   | 61                      | Partially finished         | 13                      | Total  | 61                      | Gray bat  | 1                       |
|   |                         | Completely finished        | 8                       |  |                         | Least tern                                      | 1                       |
|   |                         | Includes candidate species | 17                      |  |                         | Peregrine falcon                                | 1                       |
|   |                         |                            | —                       |  |                         | Piping plover                                   | 1                       |
|   |                         | Total Projects             | 22                      |  |                         | Fish  |                         |
|   |                         |                            |                         |  |                         | Anadromous fish                                 | 1                       |
|   |                         |                            |                         |  |                         | Neosho madtom                                   | 1                       |
|   |                         |                            |                         |  |                         | Reptiles/Amphibians                             |                         |
|   |                         |                            |                         |  |                         | Ornate box turtle                               | 1                       |
|   |                         |                            |                         |  |                         | Invertebrates                                   |                         |
|   |                         |                            |                         |  |                         | Higgin's eye pearlymussel                       | 1                       |
|   |                         |                            |                         |  |                         | Plants  |                         |
|   |                         |                            |                         |  |                         | Running buffalo clover                          | 1                       |

<sup>a</sup> Species are listed as reported by respondents.

Table 55. Availability of guidance to Corps projects on the management of threatened and endangered species (Q60 and Q61).

| T&E Species Addressed<br>In Project OMP? <sup>a</sup> (Q60) |                               | Other Sources of Guidance (Q61)                                 |                               |
|---|-------------------------------|---|-------------------------------|
| Response  | No.<br>Projects<br>Responding | Available Resources   | No.<br>Projects<br>Responding |
| Yes   | 48                            | Reference material on threatened<br>and endangered species      | 26                            |
| No  | 10                            | Personnel and/or expertise from<br>other agencies/organizations | 21 <sup>b</sup>               |
| Total   | 58                            | Current Management Plan   | 20                            |
|   |                               | Access to formal training                                       | 8                             |
|   |                               | Total Projects Responding                                       | —<br>39                       |

<sup>a</sup> T&E = Threatened and Endangered; OMP = Operational Management Plan.

<sup>b</sup> Nineteen of 21 projects utilizing endangered species personnel or expertise from other agencies most often sought assistance from state agencies (14) and/or the U.S. Fish and Wildlife Service (13).

Table 56. Ongoing monitoring activities associated with threatened, endangered, and sensitive species on Corps projects (Q62).

| Monitoring Activity<br>(No. of Projects) |                                    |                 |              |                  | Monitoring Activity<br>(No. of Projects) |                                    |                 |              |                  |
|--|------------------------------------|-----------------|--------------|------------------|--|------------------------------------|-----------------|--------------|------------------|
| Taxa <sup>a</sup>                        | Projects<br>Reporting <sup>b</sup> | Popu-<br>lation | Habi-<br>tat | Recruit-<br>ment | Taxa <sup>a</sup>                        | Projects<br>Reporting <sup>b</sup> | Popu-<br>lation | Habi-<br>tat | Recruit-<br>ment |
|  |                                    |                 |              |                  |  |                                    |                 |              |                  |
| Birds                                    |                                    |                 |              |                  |  |                                    |                 |              |                  |
| Bald Eagle                               | 25                                 | 25              | 3            | 8                | Mussel (unspecified)                     | 1                                  | 1               | 1            | 1                |
| Golden Eagle                             | 1                                  | 1               | 1            | 1                | Higgins' Eye Pearlymussel                | 1                                  | 1               | 1            | 1                |
| Interior Least Tern                      | 1                                  | 1               | -            | 1                |  | -                                  | -               | -            | -                |
| Least Tern                               | 1                                  | 1               | 1            | -                |  | 2                                  | 2               | 2            | 2                |
| Peregrine Falcon                         | 2                                  | 1               | -            | -                | Reptiles/Amphibians                      |                                    |                 |              |                  |
| Red-Shouldered Hawk                      | 1                                  | 1               | 1            | 1                | Ornate Box Turtle                        | 1                                  | 1               | 1            | -                |
| Piping Plover                            | 2                                  | 2               | 2            | -                | Red Hills Salamander                     | 1                                  | -               | 1            | -                |
|  | -                                  | -               | -            | -                |  | -                                  | -               | -            | -                |
|  | 27                                 | 26              | 6            | 8                |  | 2                                  | 1               | 2            | -                |
| Fish                                     |                                    |                 |              |                  |  |                                    |                 |              |                  |
| Chinook Salmon                           | 2                                  | 1               | -            | 1                | Plants                                   |                                    |                 |              |                  |
| Neosho Madtom                            | 1                                  | 1               | -            | -                | Meads Milkweed                           | 1                                  | 1               | -            | -                |
| Roanoke Logperch                         | 1                                  | 1               | -            | -                | <u>Aster vialis</u>                      | 1                                  | 1               | 1            | 1                |
| Anadromous Fishes                        | 1                                  | -               | -            | -                | Prices Potato Bean                       | 1                                  | 1               | 1            | 1                |
| Sockeye Salmon                           | 1                                  | 1               | -            | -                | Western Wall Flower                      | 1                                  | 1               | -            | -                |
|  | -                                  | -               | -            | -                |  | -                                  | -               | -            | -                |
|  | 4                                  | 3               | 0            | 1                |  | 3                                  | 3               | 2            | 2                |

<sup>a</sup> Species are listed as reported by respondents.

<sup>b</sup> A total of 30 projects reporting monitoring activity; totals may be less than the column sum because some projects reported more than one monitoring activity.

Table 57. Activities substantially affecting the management of endangered, threatened, and sensitive species on Corps projects (Q64 and Q65).

| On-Project Activities Affecting or Affected By<br>Threatened and Endangered Species (Q64) |                               |                               | Off-Project Activities Affecting The Management<br>Of Threatened and Endangered Species (Q65) |                            |                               |
|---|-------------------------------|-------------------------------|---|----------------------------|-------------------------------|
| Selected Activity   |                               | Affected Species <sup>a</sup> |   | Taxa Affected <sup>a</sup> |                               |
| Category  | No.<br>Projects<br>Responding | Affected<br>Species           | No.<br>Projects<br>Responding   | Category                   | No.<br>Projects<br>Responding |
| Visitor recreation  | 11                            | Birds                         |   | Logging                    | 3                             |
| Project operations  | 12                            | Bald eagle                    | 11  | Development                | 3                             |
| Natural resource  | 6                             | Piping plover                 | 2   | Forest management          | 1                             |
| management  | —                             | Least tern                    | 2   | Agricultural drainage      | 1                             |
|   |                               | Golden eagle                  | 1   | Habitat loss               | 1                             |
|   |                               | Red-shouldered hawk           | 1   |                            | —                             |
| Total Projects  | 17                            |                               |   | Total Projects             | 7                             |
|   |                               | Fishes                        |   |                            |                               |
|   |                               | Salmon spp.                   | 3   |                            |                               |
|   |                               | Neosho madtom                 | 1   |                            |                               |
|   |                               | Mammals                       |   |                            |                               |
|   |                               | Gray bat                      | 2   |                            |                               |
|   |                               | Indiana bat                   | 2   |                            |                               |
|   |                               | Invertebrates                 |   |                            |                               |
|   |                               | Brookfloater mussel           | 1   |                            |                               |
|   |                               | Higgin's eye pearl mussel     | 1   |                            |                               |
|   |                               | Dwarf red mussel              | 1   |                            |                               |
|   |                               |                               | —   |                            |                               |
|   |                               | Total Projects                | 17  | Total Projects             | 7                             |

<sup>a</sup> Species are listed as reported by respondents.



Table 58. Agency responsibility for management of Federally listed threatened and endangered species on the natural resource outgrants of Corps projects (Q69a and Q69b).

| Specification of<br>T&E Responsibilities<br>in Lease (Q69a) |                               | T&E Activities on Outgrants (Q69b)             |     |    |   |        |      |               |
|---|-------------------------------|--|-----|----|---|--------|------|---------------|
|   |                               | Occurrence<br>On Outgrant<br>(No. of Projects) |     |    | Responsible Agency<br>(No. of Projects) |        |      | Don't<br>Know |
|   |                               | Activity                                       | Yes | No | Project                                 | Lessee | Both |               |
| Response  | No.<br>Projects<br>Responding |  |     |    |   |        |      |               |
| Yes   | 16                            | Inventories                                    | 16  | 9  | 1                                       | 4      | 11   | 3             |
| No  | 25                            | Status surveys                                 | 15  | 9  | 2                                       | 5      | 12   | 2             |
|   | —                             | Protection and<br>management                   | 16  | 7  | 2                                       | 6      | 9    | 4             |
| Total   | 41                            |  |     |    |   |        |      | 1             |

Table 59. Frequency of consultations by projects with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service in regard to Federally listed threatened and endangered species (Q67 and Q68).

| Informal Endangered Species Consultations (Q67) |                         |                                  |    | Formal Section 7 Consultations (Q68) |    |
|---|-------------------------|----------------------------------|----|--------------------------------------|----|
| Frequency                                       | Nature of Assistance    |                                  |    |                                      |    |
| Consultations In Last 5 Yrs                     | No. Projects Responding | Response                         |    | Response                             |    |
|   |                         | No. Projects                     |    | Projects                             |    |
| 0   | 33                      | Site visit                       | 8  | Yes                                  | 4  |
| 1   | 12                      | Screening possible species       | 15 | No                                   | 57 |
| 2   | 6                       | Habitat/Life-history information | 9  |                                      |    |
| 3-5   | 8                       | Inventories and/or surveys       | 8  | Total                                | 61 |
| 6-10  | 0                       | Management plan formulation      | 7  |                                      |    |
| 11+   | 2                       | Informal opinion                 | 13 |                                      |    |
|   | --                      |                                  | -- |                                      |    |
| Total Projects                                  | 61                      | Total Projects                   | 28 |                                      |    |

Table 60. A list of formal Section 7 consultations<sup>a</sup> on surveyed Corps projects (Q68).

| Division | Project Action    | Species Impacted   | Year      |          | Jeopardy Opinion? | Outcome                   |
|----------|-------------------|--|-----------|----------|-------------------|---------------------------|
|          |                   |  | Initiated | Resolved |                   |                           |
| SAD      | flood control     | Southern combshell <sup>b</sup><br>Black chubshell <sup>b</sup><br>Heavy pigtoe <sup>b</sup> | 1989      | -        | yes               | project modified          |
| NCD      | dike construction | Higgin's eye pearl mussel  | 1989      | 1990     | no                | project modified          |
| NCD      | harbor dredging   | Higgin's eye pearl mussel  | 1993      | 1993     | yes               | project modified          |
| NPD      | not indicated     | not indicated  | -         | -        | -                 | adverse effects mitigated |

<sup>a</sup> All reported consultations were with the U.S. Fish and Wildlife Service.

<sup>b</sup> Project provided the scientific names Epioblasma pentia, Pleurobema cortum, and Pleurobema taitianum in reporting these species of mussels.



# **Appendix A**

## **Listing of Corps Projects in the Survey Sampling Frame**

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**Table A1**  
**Listing of Corps Projects in the Survey Sampling Form**

| Natural Resource<br>Management System<br>ID Code                     | Project Name   |
|--|--|
| Lower Mississippi Valley Division                                    |  |
| Combined*  | Red River Waterway Pool 1 (B401052) and Pool 2 (B400065)   |
| B302560*   | Clarence Cannon Dam and Mark Twain Lake  |
| B407090*   | Grenada Lake   |
| B316691*   | Lake Shelbyville   |
| B412170*   | Lake Greeson   |
| B416370*   | Sardis Lake  |
| B419370  | Wallace Lake   |
| B404530  | DeGray Lake  |
| B319420  | Wappapello Lake  |
| B315190  | Rend Lake  |
| B413780  | Pearl River  |
| Combined   | Ouachita-Black Rivers including: Calion Pool (B427042),<br>Jonesville Pool (B400225), Columbia Pool (B400214),<br>Felsenthal Pool (B42043)   |
| B311380  | Riverlands - Lower   |
| B400600  | Arkabutla Lake   |
| B308040  | Riverlands - Illinois  |
| B400105  | Bayou Bodcau Reservoir   |
| B405590  | Enid Lake  |
| B401730  | Lake Ouachita  |
| B302700  | Carlyle Lake   |
| B311370  | Riverlands - Upper   |
| Missouri River Division  |  |
| C120060*   | Wilson Lake  |
| C111140*   | Milford Lake   |
| C272285*   | Bear Creek Lake  |
| C108730*   | Kanopolis Lake   |
| C205780*   | Cold Brook Lake  |
| C206270*   | Lake Francis Case  |
| C203070  | Cherry Creek Lake  |
| Combined   | Salt Creek Lakes including: Holmes Lake (C260018), Yankee<br>Hill Lake Salt Creek Tributary (C260014), Olive Creek Lake<br>(C260010), Stagecoach Lake (C260013), Conestoga Lake<br>(C260015), Wagontrain Lake (C260012), Twin Lakes (C260016),<br>Bluestem Lake (C260011), Pawnee Lake (C260017), Branched<br>Oak Lake (C260019) |
| C172276  | Longview Lake  |
| Note: Asterisk denotes project selected for inclusion in the sample. |  |
| (Sheet 1 of 11)  |  |

**Table A1 (Continued)****Natural Resource  
Management System  
ID Code****Project Name**

## Missouri River Division (continued)

|          |   |
|----------|---|
| C110030  | Long Branch Lake  |
| C117560  | Stockton Lake   |
| C118660  | Tuttle Creek Lake   |
| C206400  | Lake Sakakawea  |
| C201970  | Bowman Halley Lake  |
| C272296  | Zorinsky Lake   |
| C108840  | Harry S. Truman Dam and Reservoir   |
| C201420  | Lake Sharpe   |
| C201068  | Snyder-Winnebago  |
| C214120  | Pipestem Lake   |
| C103480  | Clinton Lake  |
| C114880  | Rathbun Lake  |
| C114270  | Pomme de Terre Lake   |
| C107540  | Hillsdale Lake  |
| C206230  | Fort Peck Project   |
| C113920  | Perry Lake  |
| Combined | Papio Lakes including: Standing Bear Lake (C25330),<br>Wehrspann Lake (C201066), Glenn Cunningham Lake<br>(C260020) |
| C116980  | Smithville Lake   |
| C203020  | Chatfield Lake  |
| C204060  | Cottonwood Springs Lake   |
| C206440  | Gavins Point Project  |
| C110950  | Melvorn Lake  |
| C107330  | Harlan County Lake  |
| C172277  | Blue Springs Lake   |
| C212960  | Lake Oahe   |
| C114280  | Pomona Lake   |

## North Atlantic Division

|          |   |
|----------|---|
| E501780* | Blue Marsh Lake                                   |
| E573825* | Francis E. Walter Dam                             |
| E101770* | Jennings Randolph Lake                            |
| E127023* | Alvin R. Bush - Kettle Creek                      |
| E104150* | Cowanesque Lake                                   |
| E100800* | Aylesworth Creek Lake                             |
| E573502  | Prompton Lake                                     |
| E114900  | Raystown Lake                                     |
| E508200  | IWW Delaware River To Chesapeake Bay, C + D CANAL |

(Sheet 2 of 11)

**Table A1 (Continued)**

| <b>Natural Resource<br/>Management System<br/>ID Code</b> | <b>Project Name</b>  |
|---|--|
| North Atlantic Division (continued)                       |  |
| E105230   | East Sidney Lake   |
| E140102   | Tioga-Hammond Lakes  |
| E119900   | Whitney Point  |
| E406430   | Gathright Dam-Lake Moomaw  |
| E117050   | Foster Joseph Sayers Dam   |
| E501340   | Beltzville Lake  |
| E100240   | Almond Lake  |
| E480301   | AIW Albemarle and Ches and Dismal Swamp Canal  |
| E104370   | Curwensville Lake  |
| North Central Division                                    |  |
| F411550*  | Mississippi River Pools 11-22  |
| F509220*  | Lac Qui Parle Lake   |
| Combined*   | Illinois Waterway including: Farmdale Dam (F452690) and<br>Illinois Waterway ((F408010)  |
| Combined*   | Upper Mississippi River Pools including: St Anthony Falls<br>(F574280), Pool 1 (F573914), Pool 2 (F573915), Pool 3<br>(F5711450), Pool 4 (F511460), Pool 5 (F511470), Pool 5A<br>(F511530), Pool 6 (F511480), Pool 7 (F573916), Pool 8<br>(F511500), Pool 9 (F511510), Pool 10 (F511520) |
| F403910*  | Coralville Lake  |
| F505270*  | Eau Galle Flood Control Project  |
| F305040   | Duluth-Superior Harbor   |
| F514080   | Mississippi River Headwaters Project   |
| F308960   | Kewennaw Waterway  |
| F416510   | Saylorville Lake   |
| F415070   | Lake Red Rock  |
| F507640   | Homme Lake   |
| F513410   | Orwell Lake  |
| F509300   | Baldhill Dam Lake Ashtabula  |
| F509390   | Lake Traverse  |
| F317660   | Sturgeon Bay and Lake Michigan Ship Canal  |
| New England Division                                      |  |
| D018400*  | Townshend Lake   |
| D000282*  | Black Rock Lake  |
| D010560*  | Mansfield Hollow Lake  |
| D000406*  | Cape Cod Canal   |
| D006150*  | Franklin Falls Dam   |
| D017780*  | Surry Mountain Lake  |

*(Sheet 3 of 11)*



**Table A1 (Continued)**

**Natural Resource  
Management System  
ID Code**

**Project Name**

New England Division (continued)

|         |  |
|---------|--|
| D000960 | Barre Falls Dam                              |
| D007280 | Hancock Brook Lake                           |
| D019690 | West Hill Dam                                |
| D018160 | Thomaston Dam                                |
| D001560 | Birch Hill Dam                               |
| D013450 | Otter Brook Lake                             |
| D019760 | West Thompson Lake                           |
| D019780 | Westville Lake                               |
| D001720 | Blackwater Dam                               |
| D002180 | Buffamville Lake                             |
| D018830 | Union Village Dam                            |
| D005310 | Edward Macdowell Lake                        |
| D007580 | Hodges Village Dam                           |
| D003730 | Conant Brook Dam                             |
| D003650 | Colebrook River Lake                         |
| D012850 | North Hartland Lake                          |
| D007700 | Hopkinton-Everett Lake                       |
| D012900 | Northfield Brook Lake                        |
| D007680 | Hop Brook Lake                               |
| D010000 | Littleville Lake                             |
| D075257 | Charles River Natural Valley Storage Project |
| D000850 | Ball Mountain Lake                           |
| D018610 | Tully Lake                                   |
| D012870 | North Springfield Lake                       |
| D009080 | Knightville Dam                              |
| D005120 | East Brimfield Lake                          |

North Pacific Division

|          |  |
|----------|--|
| G204080* | Cougar Lake  |
| G410260* | Lucky Peak Lake                                      |
| G410180* | Lower Granite Lock and Dam                           |
| G204020* | Cottage Grove Lake                                   |
| G311990* | Mud Mountain Dam Project White River                 |
| G410920* | McNary Lock and Dam, Lake Wallula                    |
| G204400  | The Dalles Lock and Dam, Lake Celilo                 |
| Combined | Green Peter Lake (G206940) and Foster Lake (G268002) |
| G208480  | John Day Lock and Dam, Lake Umatilla                 |
| G172738  | Chena River Lakes                                    |
| G400608  | Ice Harbor Lock and Dam, Lake Sacajawea              |

(Sheet 4 of 11)

**Table A1 (Continued)**

| Natural Resource<br>Management System<br>ID Code | Project Name  |
|--|---|
| North Pacific Division (continued)               |   |
| G373462  | Chief Joseph Dam and Rufus Woods Lake   |
| G210090  | Lost Creek Lake   |
| G405090  | Dworshak Dam & Reservoir  |
| G205830  | Fern Ridge Lake   |
| G207770  | Fall Creek Lake   |
| G300200  | Albeni Falls Dam and Lake Pend Oreille  |
| G201810  | Blue River Lake   |
| G309750  | Libby Dam and Lake Koocanusa  |
| G207530  | Hills Creek   |
| G204690  | Detroit Lake  |
| G204910  | Dorena Lake   |
| G409880  | Little Goose Lock & Dam, Lake Bryan   |
| G320280  | Wynoochee Lake  |
| Combined   | Lookout Point Lake (G273101) and Dexter Lake (G279008)  |
| G455120  | Mill Creek Lake   |
| G410210  | Lower Monumental Lock & Dam, Lake West  |
| G273459  | Bonneville Lock and Dam   |
| G272731  | Willow Creek  |
| Ohio River Division                              |   |
| H104810*   | Dillon Lake   |
| H303940*   | Cordell Hull Dam and Reservoir  |
| H200970*   | Barren River Lake   |
| H100280*   | Alum Creek Lake   |
| H206960*   | Green River Lake  |
| H104520*   | Deer Creek Lake   |
| H219200*   | West Fork of Mill Creek Lake  |
| H117840*   | Sutton Lake   |
| H418730*   | Tygart Lake   |
| Combined   | Monongahela River Projects including: Locks and Dam 2 (H471478), Locks and Dam 3 (H471491), Locks and Dam 4 (H471492), Lock and Dam 7 (H471497), Point Marion Lock and Dam (H471499), Hilderbrand Lock and Dam (H471504), Morgantown Lock and Dam (H471502), Maxwell Locks and Dam (H410840), Opekiska Lock and Dam (H413360) |
| H203310  | Clarence J. Brown Dam and Reservoir   |
| H320140  | Wolf Creek Dam Lake Cumberland  |
| H213730  | Patoka Lake   |
| H410400  | Mahoning Creek Lake   |
| H310740  | Martins Fork Lake   |

(Sheet 5 of 11)

**Table A1 (Continued)**

**Natural Resource  
Management System  
ID Code**

**Project Name**

Ohio River Division (continued)

|          |  |
|----------|--|
| H202720  | Carr Fork Lake   |
| H253400  | Green River plus 2 locks   |
| H419660  | Michael J. Kirwan Dam and Reservoir  |
| H101830  | Bluestone Lake   |
| H405150  | East Branch Clarion River Lake   |
| H105900  | Fishtrap Lake  |
| H410250  | Loyalhanna Lake  |
| H401400  | Berlin Lake  |
| H207910  | Huntington Lake  |
| H308370  | J. Percy Priest Dam and Reservoir  |
| H118300  | Tom Jenkins Dam and Burr Oak Lake  |
| H101280  | Beech Fork Lake  |
| H218010  | Taylorville Lake   |
| H303040  | Cheatham Lock and Dam  |
| H304390  | Dale Hollow Lake   |
| H403750  | Conemaugh River Lake   |
| H210570  | Cecil M. Harden Lake   |
| H202060  | Brookville Lake  |
| H416700  | Shenango River Lake  |
| H409050  | Kinzua Dam and Allegheny Reservoir   |
| H212760  | Nolin River Lake   |
| H211570  | Mississinewa Lake  |
| H117740  | Summersville Lake  |
| H104740  | Dewey Lake   |
| H114780  | R. D. Bailey Lake  |
| H418260  | Tionesta Lake  |
| H104580  | Delaware Lake  |
| H113570  | Paintsville Lake   |
| H309550  | Laurel River Lake  |
| H106790  | Grayson Lake   |
| H302840  | Center Hill Lake   |
| H215930  | Salamonie Lake   |
| H208920  | Kentucky River plus 4 Locks  |
| Combined | Ohio River-Pittsburg District including: Dashields Locks<br>and Dam (H471457), Emsworth Locks and Dams (H471458),<br>Montgomery Locks and Dam (H471456), New Cumberland Locks<br>and Dam (H413150), Pike Island Locks and Dam (H414010),<br>Hannibal Locks and Dam (H407290) |
| H108550  | John W. Flannagan Dam and Reservoir  |
| H105190  | East Lynn Lake   |
| H112710  | North Fork Of Pound River Lake   |
| H404280  | Crooked Creek Lake   |

(Sheet 6 of 11)

**Table A1 (Continued)**

| Natural Resource<br>Management System<br>ID Code | Project Name  |
|--|---|
| Ohio River Division (continued)                  |   |
| H420190  | Woodcock Creek Lake   |
| Combined   | Ohio River-Louisville District including: Lock and Dam 53 (H276115), Lock and Dam 52 (H276114), Newburgh Lock and Dam (H212560), McAlpine Lock and Dam (H210880), Markland Lock and Dam (H210690), Cannelton Lock and Dam (H202550), Smithland Lock and Dam (H216950), Uniontown Lock and Dam (H218840)   |
| Combined   | Ohio River-Huntington District including: Willow Island Locks and Dam (H120000), Robert C. Byrd Locks and Dam (H106310), Belleville Locks and Dam (H101300), Greenup Locks and Dam (H107020), Racine Locks and Dam (H114810), Capt. Anthony Meldahl Locks and Dam (H102680)   |
| H202130  | Buckhorn Lake   |
| H411870  | Mosquito Creek Lake   |
| H112690  | North Branch Kokosing River Lake  |
| H313280  | Old Hickory Lock and Dam  |
| H202350  | Caesar Creek Lake   |
| H211770  | Monroe Lake   |
| H215610  | Rough River Lake  |
| H420380  | Youghiogheny River Lake   |
| Combined   | Muskingum River Lakes including: Pleasant Hill Lake (H171148), Clendening Lake (H171142), Tappan Lake (H171159), Mohicanville Dam (H171146), Atwood Lake (H171138), Piedmont Lake (H171147), Charles Mill Lake (H171141), Wills Creek Lake (H120010), Senecaville Lake (H171149), Leesville Lake (H175047), Dover Dam (H171143), Mohawk Dam (H122190), Beach City Lake (H175046), Bolivar Dam (H171140) |
| H113550  | Paint Creek Lake  |
| H102270  | Burnsville Lake   |
| H202360  | Cagles Mill Lake  |
| H418790  | Union City Dam  |
| H205180  | William H. Harsha Lake  |
| H300940  | Barkley Lock and Dam Lake Barkley   |
| H202780  | Cave Run Lake   |
| H417580  | Stonewall Jackson Lake  |
| South Atlantic Division                          |   |
| K719220*   | W. Kerr Scott Dam and Reservoir   |
| K713990*   | Philpott Lake   |

(Sheet 7 of 11)

**Table A1 (Continued)**

| Natural Resource<br>Management System<br>ID Code | Project Name  |
|--|---|
| South Atlantic Division (continued)              |   |
| Combined*  | Tennessee Tombigbee Waterway including: Aliceville (K501039),<br>Gainesville (K501038), Aberdeen (K501041), Canal Section<br>(K501042), Bay Springs (K501091), Columbus (K501040) |
| K502730*   | Carters Lake  |
| Combined*  | Alabama River Lakes including Claiborne Lake (K503390),<br>Dannelly Lake (K511220), Woodruff Lake (K08590)  |
| K708350*   | John H. Kerr Dam and Reservoir  |
| Combined   | Walter F. George Lake (K519190) and George W. Andrews Lake<br>(K551270)   |
| K513220  | Okatibbee Lake  |
| K306090  | Four River Basins   |
| K705800  | Falls Lake  |
| K502200  | Lake Sidney Lanier  |
| K712410  | B. Everett Jordan Dam and Lake  |
| K618530  | Richard B. Russell Dam and Lake   |
| K508450  | Lake Seminole   |
| K607380  | Hartwell Lake   |
| K313240  | Lake Okeechobee and Waterway  |
| K568001  | Black Warrior and Tombigbee Lakes   |
| K519710  | West Point Lake   |
| K603350  | J. Strom Thurmond Lake  |
| K500220  | Allatoona Lake  |
| South Pacific Division                           |   |
| L201600*   | Black Butte Lake  |
| L218090*   | Lake Kaweah   |
| Combined*  | L.A. County Drainage Area including Hanson Lake (L175234),<br>Santa Fe Dam (L100761), Sepulveda Dam (L175232), Whittier<br>Narrows Dam (L174743)                                  |
| L204990*   | Lake Sonoma   |
| L113560*   | Painted Rock Dam  |
| L274645*   | Lake Mendocino  |
| L212460  | Stanislaus River Parks  |
| L111700  | Mojave River Dam  |
| L205580  | Harry L. Englebright Lake   |
| L268004  | Eastman Lake  |
| L175313  | Salinas Dam Santa Margarita Lake  |
| L100190  | Alamo Lake  |
| (Sheet 8 of 11)                                  |   |

**Table A1 (Continued)**

| Natural Resource<br>Management System<br>ID Code | Project Name  |
|--|---|
| South Pacific Division (continued)               |   |
| Combined   | Santa Ana River Projects including: Fullerton Dam (L174729),<br>Carbon Canyon Dam (L174727), Brea Dam (L174726), Prado<br>Dam (L174732) |
| L210750  | Martis Creek Lake   |
| L214040  | Pine Flat Lake  |
| L217680  | Success Lake  |
| L268006  | Hensley Lake  |
| L212390  | New Hogan Lake  |
| Southwest Division                               |   |
| M404620*   | DeQueen Lake  |
| M108510*   | John Martin Dam   |
| M103520*   | Cochiti Lake  |
| M505650*   | Eufaula Lake  |
| M209580*   | Lavon Lake  |
| M508530*   | John Redmond Reservoir  |
| M106290*   | Galisteo Dam  |
| M504100*   | Council Grove   |
| M404450*   | Dardanelle Lake   |
| M406550  | Gillham Lake  |
| M110080  | Santa Rosa Dam and Lake   |
| M518050  | Tenkiller Ferry Lake  |
| M403420  | Clearwater Lake   |
| M108440  | Jemez Canyon Dam  |
| M575378  | Skiatook Lake   |
| M100070  | Abiquiu Dam   |
| M404770  | Dierks Lake   |
| M513340  | Oologah Lake  |
| M219920  | Whitney Lake  |
| M412620  | Nimrod Lake   |
| M502040  | Broken Bow Lake   |
| M217530  | Stillhouse Hollow Reservoir   |
| M412830  | Norfork Lake  |
| M209420  | Joe Pool Lake   |
| M574925  | Sardis Lake   |
| M474912  | Bull Shoals Lake  |
| M413520  | Ozark Lake  |
| M219250  | Waco Lake   |
| M506040  | Fort Supply Lake  |
| M502570  | Canton Lake   |

(Sheet 9 of 11)

**Table A1 (Continued)**

| Natural Resource<br>Management System<br>ID Code | Project Name   |
|--|--|
| Southwest Division (continued)                   |  |
| M513700  | Pat Mayse Lake   |
| M274871  | Town Bluff Dam B. A. Steinhagen Lake   |
| M510650  | Marion Reservoir   |
| M519590  | Webbers Falls Lock and Dam 16  |
| M218110  | Wright Patman Dam and Lake   |
| M103740  | Conchas Lake   |
| M401230  | Beaver Lake  |
| Combined   | Addicks Dam (M302160) and Barker Dam (M375376)   |
| M401800  | Blue Mountain Lake   |
| M513370  | Optima Lake  |
| M212260  | Navarro Mills Lake   |
| M505790  | Fall River Lake  |
| M201330  | Belton Lake  |
| M217110  | Somerville Lake  |
| M506850  | Great Salt Plains  |
| M519570  | Waurika Lake   |
| M411240  | Millwook Lake  |
| M201350  | Benbrook Lake  |
| M503890  | Copan Lake   |
| M418030  | Table Rock Lake  |
| M574945  | Texoma Lake  |
| M505360  | Elk City Lake  |
| M118480  | Trinidad Lake  |
| M118720  | Two Rivers Dam   |
| M518350  | Toronto Lake   |
| Combined   | Arkansas River Tulsa District including: WD Mayo Lock and Dam 14 (M574773), Newt Graham Lock and Dam 18 (M500788), Chouteau Lock and Dam 17 (M500787)  |
| Combined   | Arkansas River Little Rock District including: Murray Lock and Dam (M400747), Pool 3 Lock and Dam (M400743), Rockefeller Lake Ormand Lock and Dam (M400749), John Paul Hammerschmidt Lake (M400753), Norrell Lock and Dam (M400741), Pool 4 Lock and Dam (M400744), David D. Terry Lock and Dam (M400746), Pool 5 Lock and Dam (M400745), Toad Suck Ferry Lock and Dam (M400748), Wilber D. Mills Lock and Dam (M400742) |
| M575012  | Arcadia Lake   |
| M501540  | Birch Lake   |
| M274787  | Ray Roberts Lake   |
| M507850  | Hulah Lake   |
| M575261  | Truscott Brine Lake, Area VIII   |

(Sheet 10 of 11)

**Table A1 (Concluded)**

| Natural Resource<br>Management System<br>ID Code | Project Name                          |
|--|---------------------------------------|
| Southwest Division (continued)                   |                                       |
| M275357  | Granger Lake                          |
| M407070  | Greers Ferry Lake                     |
| M508990  | Keystone Lake                         |
| M214580  | Proctor Lake                          |
| M505350  | El Dorado Lake                        |
| M207710  | Hords Creek Lake                      |
| M508790  | Kaw Lake                              |
| M203820  | Cooper Lake                           |
| M507830  | Hugo Lake                             |
| M202590  | Canyon Lake                           |
| M216040  | Sam Rayburn Reservoir                 |
| M514030  | Pine Creek Lake                       |
| M507500  | Heyburn Lake                          |
| M501450  | Pearson-Skubitz Big Hill Lake         |
| M506000  | Fort Gibson Lake                      |
| M200930  | Bardwell Lake                         |
| M520120  | Wister Lake                           |
| M205850  | Ferrells Bridge Dam Lake O' The Pines |
| M209740  | Lewisville Lake                       |
| M274786  | Aquilla Dam & Lake                    |
| M515370  | Robert S. Kerr, Lock and Dam 15       |
| M216090  | O.C. Fisher Lake                      |
| M275358  | Lake Georgetown                       |
| M206760  | Grapevine Lake                        |

*(Sheet 11 of 11)*



# **Appendix B**

## **Facsimile of Questionnaire**

### **Mailed to Corps Projects**

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U.S. ARMY CORPS OF ENGINEERS  
NATURAL RESOURCES MANAGEMENT PRACTICES AND PRIORITIES

Project(s): \_\_\_\_\_

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# **PROJECT-WIDE**

1. Estimate the allocation of your 1995 project budget for programs and activities in the functional areas below. Since there is no separate budget line item for most of these areas, estimates should represent percentage of funds actually spent on the resource.

| Program Area  | % of Budget | Approx. dollar amount now compared to 5 years ago |
|---|-------------|---|
| Project Operation and Maintenance<br>(Not recreation/natural resources) | _____       | decrease / same / increase                        |
| Park Management and Visitor Services                                    | _____       | decrease / same / increase                        |
| NATURAL RESOURCES   |             |   |
| Shoreline Management  | _____       | decrease / same / increase                        |
| Management of Terrestrial Resources                                     | _____       | decrease / same / increase                        |
| Management of Aquatic/fisheries Resources                               | _____       | decrease / same / increase                        |
| Wetland Development/Preservation/Management                             | _____       | decrease / same / increase                        |
| Threatened and Endangered Species Management                            | _____       | decrease / same / increase                        |
| Management of Cultural Resources  | _____       | decrease / same / increase                        |
| Other Natural Resource Management Programs                              | _____       | decrease / same / increase                        |
| (Specify) _____   | _____       | decrease / same / increase                        |
| TOTAL   | 100%        |   |

2. How many employees (excluding office support staff) work under the project manager in the following areas:

|   | Full time<br>GS-9 or<br>above | Full time<br>GS-7 or<br>below | Part time,<br>seasonal,<br>IPA, etc. |
|---|-------------------------------|-------------------------------|--------------------------------------|
| Solely in natural resource management   | _____                         | _____                         | _____                                |
| Solely in park management or visitor services                                     | _____                         | _____                         | _____                                |
| Both in natural resource management and<br>in park management or visitor services | _____                         | _____                         | _____                                |

3. Identify the project staff member (by initials only) most directly responsible for management of the following natural resources on the project(% of time on the resource should indicate the total amount of time dedicated to the resource, regardless of whether time is spent on more than one project):

| Resource    | Initials of<br>Responsible<br>Person | % of time<br>on this<br>resource | List degree(s) and major(s) | List any<br>Professional<br>Certifications |
|-------------|--------------------------------------|----------------------------------|-----------------------------|--|
| Fisheries   |                                      |                                  |                             |  |
| Wildlife    |                                      |                                  |                             |  |
| Forest      |                                      |                                  |                             |  |
| Range       |                                      |                                  |                             |  |
| Wetlands    |                                      |                                  |                             |  |
| T&E species |                                      |                                  |                             |  |
| Cultural    |                                      |                                  |                             |  |

4. Approximately what percentage of the natural resource management program on your project is based on the following authorities?

|   | percentage |
|---|------------|
| a. MITIGATION (lands officially designated for mitigation by statutory authority)   |            |
| b. ENHANCEMENT (cost shared wildlife enhancement activities as authorized by PL 89-72 or any special congressional authorization) |            |
| c. STEWARDSHIP (project lands and waters managed under the authority of the Flood Control Act of 1944)                            |            |
| d. Other (please list)  |            |
| e. Don't know.  |            |
| TOTAL   | 100%       |

5. If any natural resource management programs or activities occur outside of project boundaries, indicate the following:

a. Approximately what percentage of your project budget is spent for natural resource management activities outside of the project boundary? \_\_\_\_\_

b. Describe in general terms the natural resource management programs or activities that take place outside of the project boundary.

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6. To what degree are the following documents referred to when making major natural resource management decisions on your project?

|  | always | sometimes | never | does not apply |
|--|--------|-----------|-------|----------------|
| General Design Memorandum              | _____  | _____     | _____ | _____          |
| Project Environmental Impact Statement | _____  | _____     | _____ | _____          |
| Project Master Plan                    | _____  | _____     | _____ | _____          |
| Operational Management Plan            | _____  | _____     | _____ | _____          |
| Annual Work Plan                       | _____  | _____     | _____ | _____          |
| Other (please list)                    | _____  | _____     | _____ | _____          |

7. List the 5 most common natural resource issues or concerns of people residing near the project.

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

8. List the 5 most common natural resource issues or concerns of park visitors (day users, campers, etc.)

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

9. Rate what you perceive to be the overall significance (1=least important; 10=most important) of the following natural resources on your project from both a local perspective and a regional perspective.

| Ecosystems                                  | Local |   |   |   |   |   |   |   |   |    | Regional |   |   |   |   |   |   |   |   |    |
|---|-------|---|---|---|---|---|---|---|---|----|----------|---|---|---|---|---|---|---|---|----|
|   | 1     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Forest land                                 |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Agricultural land                           |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Native prairie                              |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Other open lands<br>(fields, pasture, etc.) |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Scrub/shrub habitats                        |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Riparian zones                              |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Wetlands                                    |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Aquatic habitats                            |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Other                                       |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
|   |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Biota                                       | Local |   |   |   |   |   |   |   |   |    | Regional |   |   |   |   |   |   |   |   |    |
|   | 1     | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Upland game species                         |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Nongame species                             |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Waterfowl                                   |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Furbearers                                  |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| T&E species                                 |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Sensitive plant<br>communities              |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Coldwater/stream fishes                     |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Warm-water fishes                           |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |
| Other                                       |       |   |   |   |   |   |   |   |   |    |          |   |   |   |   |   |   |   |   |    |

10. If you have contracts, cooperative agreements, or partnerships with universities, other government agencies or national environmental organizations (e.g., Ducks Unlimited, Sierra Club) involving some aspect of natural resource management, indicate below:

| Partnership<br>Organization | Management<br>Activity | Role of<br>Partner | Role of<br>Project Staff |
|-----------------------------|------------------------|--------------------|--------------------------|
|                             |                        |                    |                          |
|                             |                        |                    |                          |
|                             |                        |                    |                          |
|                             |                        |                    |                          |
|                             |                        |                    |                          |
|                             |                        |                    |                          |
|                             |                        |                    |                          |
|                             |                        |                    |                          |

11. If there are local volunteer groups (such as sportsman's clubs, scout troops, local civic or environmental groups) that perform or participate in natural resource management programs on your project, list each organization, describe its management program or contribution, and indicate whether this work would be likely to continue if the volunteer organization did not provide these services. Please make one entry only for each group, even if they engage in several activities (e.g., Boy Scouts of America- installation of wood duck boxes and bluebird nest boxes).

| Name of<br>Organization | Brief description of program/contribution | Status<br>check one |                    | Would work<br>continue w/o<br>voluntary<br>contribution? |
|-------------------------|---|---------------------|--------------------|--|
|                         |   | one-time<br>effort  | on-going<br>effort |  |
|                         |   |                     |                    | Y / N  |
|                         |   |                     |                    | Y / N  |
|                         |   |                     |                    | Y / N  |
|                         |   |                     |                    | Y / N  |
|                         |   |                     |                    | Y / N  |





15. List any areas set-aside as reserves, environmental demonstrations, research activities, or other special purposes.

| Reserve, Demonstration, or Study | Description of | Developed or performed by | Years | Acreage |
|----------------------------------|----------------|---------------------------|-------|---------|
| _____                            | _____          | _____                     | _____ | _____   |
| _____                            | _____          | _____                     | _____ | _____   |
| _____                            | _____          | _____                     | _____ | _____   |
| _____                            | _____          | _____                     | _____ | _____   |

16. If you have outleases for grazing or other agricultural purposes, answer the following:

- a. What is the total acreage of project lands outleased (estimate if necessary)? \_\_\_\_\_ acres
- b. Indicate agricultural use for a typical year. Provide approximate total acreage of each crop or use.

| Agricultural Use | Approximate Acreage |
|------------------|---------------------|
| Grazing          | _____               |
| Hay              | _____               |
| Crops (list):    | _____               |
| _____            | _____               |
| _____            | _____               |

c. What is the percentage of agricultural land managed using the following practice:

|                      |       |
|----------------------|-------|
| Conventional tillage | _____ |
| Low-till             | _____ |
| No-till              | _____ |

d. What percentage of your outleased agricultural land can be regarded as marginal for crop production? \_\_\_\_\_

e. Rank in order of importance (1=most important, 2=second most important, etc.) what you try to accomplish with agricultural outleases (NA=any item that is not relevant on your project).

| Rank  | Accomplishment  |
|-------|---|
| _____ | Tax base for local government   |
| _____ | Benefits to wildlife associated with lease requirements<br>(e.g., fencing, wildlife habitat improvement, erosion control practices) |
| _____ | Benefits for local farmers/ranchers   |
| _____ | Enhance vegetative diversity and cover type management  |
| _____ | Other (specify) _____   |

f. Describe any restrictions, or commonly used practices, on agriculture outleases that are specifically intended to benefit wildlife.

| Restrictions/Commonly Used Practices | Percentage of leased land on which these practices are applied |        |                |
|--------------------------------------|--|--------|----------------|
| _____                                | 1-25%  | 25-50% | 50-75% 75-100% |
| _____                                | 1-25%  | 25-50% | 50-75% 75-100% |
| _____                                | 1-25%  | 25-50% | 50-75% 75-100% |

g. Briefly describe management alternatives for outleased lands on which agriculture has been discontinued.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

h. Describe any significant changes in management or use of agricultural lands that are on-going or anticipated within the next 10 years.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

17. Rank the contributions (1=most important, 2=second most important, etc.; NA=does not apply) of the following programs in the management of your project's natural resources. Also, estimate how much the use of these projects has changed during the last 10 years and how much you anticipate they will change in the next 10 years.

|                                      | Rank<br>Importance | Today as compared<br>to 10 years ago | 10 years from now<br>compared to today |
|--------------------------------------|--------------------|--------------------------------------|--|
| CE funded and implemented programs   | —                  | decrease / same / increase           | decrease / same / increase             |
| Agricultural Outleases               | —                  | decrease / same / increase           | decrease / same / increase             |
| Natural Resources Outgrants          | —                  | decrease / same / increase           | decrease / same / increase             |
| Cooperative Agreements               | —                  | decrease / same / increase           | decrease / same / increase             |
| Participation of Local Organizations | —                  | decrease / same / increase           | decrease / same / increase             |
| Specify other _____                  | —                  | decrease / same / increase           | decrease / same / increase             |
| Specify other _____                  | —                  | decrease / same / increase           | decrease / same / increase             |

18. Identify problems on project lands that cause natural resource damage or hinder effective natural resource management. Rate the spatial extent and the severity of each problem.

| Problem                               | Extent |        |   |   |   |   |   |   |   |    | Severity  |        |          |   |   |   |   |   |   |   |    |           |
|---------------------------------------|--------|--------|---|---|---|---|---|---|---|----|-----------|--------|----------|---|---|---|---|---|---|---|----|-----------|
|                                       | Q=none | 1=rare | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10=common | Q=none | 1=slight | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10=severe |
| Property Encroachment                 | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Livestock Trespass                    | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Theft of Timber                       | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Wildlife Poaching                     | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Dumping of Trash                      | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Off-road Vehicles                     | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Vandalize/Theft of Cultural Resources | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Shoreline Erosion                     | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Wildfire                              | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Road/utility Easements                | 0      | 1      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        | 0      | 1        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10        |
| Other:                                | 1      | 2      | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |           | 1      | 2        | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |           |
| Other:                                | 1      | 2      | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |           | 1      | 2        | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |           |

19. Describe changes in the use of lands adjacent to your project, evaluate the extent of these changes, and estimate trends over next 10 years. Examples of changes in land use include increased development, conversion to or from agriculture, or changes in forest cover types.

| Nature of Change | Extent  |   |   |   |   |   |   |   |   |              | Estimated trend over next 10 years |  |  |  |  |  |  |  |  |  |
|------------------|---------|---|---|---|---|---|---|---|---|--------------|------------------------------------|--|--|--|--|--|--|--|--|--|
|                  | 1=minor | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10=extensive |                                    |  |  |  |  |  |  |  |  |  |
|                  | 1       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10           | decrease / same / increase         |  |  |  |  |  |  |  |  |  |
|                  | 1       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10           | decrease / same / increase         |  |  |  |  |  |  |  |  |  |
|                  | 1       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10           | decrease / same / increase         |  |  |  |  |  |  |  |  |  |

**TERRESTRIAL RESOURCES**

20. Which of the following broad ecosystems or cover types occur on your project?

| Ecosystem/Cover type    | Exist on<br>Project? | Actual or<br>estimated area<br>(acres) |
|-------------------------|----------------------|--|
| Forest Land             | Y / N                | _____                                  |
| Open woodland/savanna   | Y / N                | _____                                  |
| Grasslands or Openlands | Y / N                | _____                                  |
| Shrub/Scrub/Brushland   | Y / N                | _____                                  |
| Other _____             | Y / N                | _____                                  |
| Other _____             | Y / N                | _____                                  |

21. If available, provide a list of cover types identified on your project and an estimate of the acreage of each. Use separate sheets if more space is needed. These may be photocopied from your OMP or other documents.

22. Is there a current inventory of project resources for the following terrestrial biota:

| Biota                  | Inventory Execution |                    | Year Prepared | Prepared By (agency) |
|------------------------|---------------------|--------------------|---------------|----------------------|
|                        | No                  | Partially Complete |               |                      |
| a. Reptiles/Amphibians | _____               | _____              | _____         | _____                |
| b. Mammals             | _____               | _____              | _____         | _____                |
| c. Birds               | _____               | _____              | _____         | _____                |
| d. Invertebrates       | _____               | _____              | _____         | _____                |
| e. Plants              | _____               | _____              | _____         | _____                |

23. Are USDA soil surveys and land use capability recommendations used in making natural resource management decisions? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, is soil information included in each site specific management prescription in your OMP?  
Yes \_\_\_\_\_ No \_\_\_\_\_

24. If prescribed burning is used on the project, indicate the following:

a. How many acres of project land are periodically burned?

| <u>Land type</u>  | <u>Acreage</u> |
|---|----------------|
| Hardwood Forest   | _____          |
| Coniferous Forest   | _____          |
| Grasslands, including Range,<br>Permanent Forest Openings, etc. | _____          |
| Marsh/Wetlands  | _____          |
| Other   | _____          |

b. Indicate the primary purposes for which prescribed burning is used (circle all that apply).

Purpose of burn

|                              |          |
|------------------------------|----------|
| Wildfire Hazard Reduction    | No / Yes |
| Forest Site Preparation      | No / Yes |
| Forest Understory Management | No / Yes |
| Maintenance of Grasslands    | No / Yes |
| Native Prairie Restoration   | No / Yes |
| Wildlife Habitat Management  | No / Yes |
| Marsh Management             | No / Yes |
| Vector Control               | No / Yes |
| Other                        | No / Yes |

Prescribed for  
this purpose

25. If you have at least 100 acres of forested land on your project, answer the following:

- a. Do you have a current inventory of forested lands? (circle one) Yes / No
- b. If yes, what forest inventory system do you use? (circle letter and/or supply appropriate information)
  - i. US Forest Service: Continuous Inventory of Stand Condition Classes (or similar system)
  - ii. Remeasurement of Permanent Growth/Inventory Plots
  - iii. Other (briefly describe) \_\_\_\_\_

c. If yes, identify the parties directly involved in the following management activities on forested project lands: (check all that apply)

|                          |                          |   |
|--------------------------|--------------------------|---|
|                          | Inventory/timber cruises | Formulation of Management Prescriptions |
| Project foresters        | _____                    | _____                                   |
| Other project personnel  | _____                    | _____                                   |
| Consulting foresters     | _____                    | _____                                   |
| State forestry personnel | _____                    | _____                                   |
| Other (specify) _____    | _____                    | _____                                   |

26. For the major forest cover types on your project, provide or estimate the following:

| Cover<br>Type Categories                                  | Predominate<br>Forest type | Estimated %<br>of project<br>Forested<br>Land | Typical<br>Stand<br>size<br>(acres) | Typical<br>Rotation<br>in years | % Acreage<br>Old Growth |
|---|----------------------------|---|-------------------------------------|---------------------------------|-------------------------|
| Bottomland Hardwoods<br>(including riparian<br>woodlands) | _____                      | _____   | _____                               | _____                           | _____                   |
| Upland Hardwoods  | _____                      | _____   | _____                               | _____                           | _____                   |
| Mixed Coniferous/<br>Hardwoods                            | _____                      | _____   | _____                               | _____                           | _____                   |
| Planted Coniferous<br>Stand                               | _____                      | _____   | _____                               | _____                           | _____                   |
| Naturally Regenerated<br>Coniferous Stand                 | _____                      | _____   | _____                               | _____                           | _____                   |
| Other _____   | _____                      | _____   | _____                               | _____                           | _____                   |

27. On average, what percentage of forested land, subject to commercial harvest, will be regenerated by the following methods?

|            | Clear-cutting<br>(even-aged management) | Selection cutting<br>(uneven-aged management) |
|------------|---|---|
| Hardwood   | _____ %                                 | _____ %                                       |
| Coniferous | _____ %                                 | _____ %                                       |



28. Approximately how many acres of forest land are held in reserve primarily for wildlife (e.g., lands not specifically managed for commercial harvest? \_\_\_\_\_

29. Is fuelwood cutting allowed on your project? Yes \_\_\_\_\_ No \_\_\_\_\_

a. If yes, what percentage of forest land is open to fuelwood cutting? \_\_\_\_\_

b. What products are allowed to be harvested as part of fuelwood cuts?

Dead standing trees \_\_\_\_\_  
Fallen timber \_\_\_\_\_  
Residual tree parts \_\_\_\_\_  
Harvest debris only \_\_\_\_\_

30. Is chemical treatment employed as part of your forest management program? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, chemicals are used for which of the following objectives:

Chemical thinning \_\_\_\_\_

Pest control \_\_\_\_\_

Other \_\_\_\_\_

31. Identify any on-going or anticipated changes in management of major forest types such as changes in stand rotation, conversion from one cover type to another, or net increases or decreases in forest acreage. Explain why the change is occurring; be as specific as possible.

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32. Do riparian\* habitats occur on your project? Yes ☐ No ☐
- a. If riparian habitats are present, approximately what percentage of the land area do they cover (circle the closest estimate)?
- 1-2% 3-5% 5-10% 10-20% 20-30% 30-40% 40-50% >50%

- b. Which of the following management practices are applied to riparian zones on your project?

| Practice                         | Degree of use                 |
|----------------------------------|-------------------------------|
| Bank protection                  | never / sometimes / regularly |
| Stream improvement               | never / sometimes / regularly |
| Revegetation/restoration         | never / sometimes / regularly |
| Fencing/restricted access        | never / sometimes / regularly |
| Timber harvest restrictions      | never / sometimes / regularly |
| Buffer zone/corridor development | never / sometimes / regularly |
| Other _____                      | never / sometimes / regularly |

33. If your project occurs in a region with grassland or shrub ecotypes that are or can be used primarily for grazing, answer the following:

- a. Do you have a vegetation inventory on these lands? (circle one) Yes / No
- b. What percentage of those lands are used for grazing? \_\_\_\_\_

34. Identify other open-land habitats on your project and briefly describe their role/application in your natural resources management program.

| Type             | Present  | Role in natural resources program |
|------------------|----------|-----------------------------------|
| Pastureland      | Yes / No | _____                             |
| Oldfields        | Yes / No | _____                             |
| Rights-of-way    | Yes / No | _____                             |
| Managed openings | Yes / No | _____                             |
| Brushlands       | Yes / No | _____                             |
| Other _____      | Yes / No | _____                             |

\* For purposes of this survey, riparian zones are considered as all habitats immediately adjacent to and ecologically associated with tributaries, streams, and rivers. They may or may not include a wetland component.

35. Which of the following management techniques are used on openland habitats on your project?

| Practice           | Habitat type | Degrees of Use            |
|--------------------|--------------|---------------------------|
| Prescribed burning |              | never/sometimes/regularly |
| Mowing             |              | never/sometimes/regularly |
| Disking/plowing    |              | never/sometimes/regularly |
| Bush hogging       |              | never/sometimes/regularly |
| Chaining/cabling   |              | never/sometimes/regularly |
| Land imprinting    |              | never/sometimes/regularly |
| Seeding/planting   |              | never/sometimes/regularly |
| Other              |              | never/sometimes/regularly |

36. Describe any changes in the condition or management of openlands that are on-going or anticipated in the next 10 years.

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37. If native prairie has been identified or established on your project, provide the following information:

- a. Number of tracts \_\_\_\_\_ and Total acreage \_\_\_\_\_
- b. Have plant species in prairie habitat been inventoried?    No | Yes partially | Yes completely
- c. Are any other organizations participating in prairie management on the project?    No / Yes

If yes, identify the organization and describe its role. \_\_\_\_\_

d. Briefly, what steps have been taken to restore, protect, or manage the native prairie on your project?

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38. Indicate the importance of the following in determining the management of terrestrial resources on your project. Also, rank them (1=highest, 2=second highest, etc.) in order of the priority they receive in your management program.

| Management Objective                     | Importance |     |   |   |   |   |   |   |      |      |
|--|------------|-----|---|---|---|---|---|---|------|------|
|  | None       | Low |   |   |   |   |   |   | High | Rank |
| Public Use Benefits                      | 0          | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 10 |
| Growth/Harvest Commercial Products       | 0          | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 10 |
| Resource Stewardship                     | 0          | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 10 |
| Regulatory Compliance                    | 0          | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 10 |
| Reserves or Environmental Demonstrations | 0          | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 10 |
| Other                                    |            | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8    | 9 10 |

39. Rank in order of importance (1=most important, 2=second most important, etc.) the following objectives for managing terrestrial resources on your project. (NA=any item that is not applicable at your project).

| Objective   | Importance during last 10 years |   |   |   |   |   |   |   |   |      | Importance in next 10 years |   |   |   |   |   |   |   |   |      |
|---|---------------------------------|---|---|---|---|---|---|---|---|------|-----------------------------|---|---|---|---|---|---|---|---|------|
|   | (0=None, 1=Low...10=High)       |   |   |   |   |   |   |   |   |      | (0=None, 1=Low...10=High)   |   |   |   |   |   |   |   |   |      |
| Manage habitat for selected game species  | 0                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Manage buffers for aquatic and/or wetland site protection                               | 0                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Manage habitat for selected non-game species or groups of species (excluding T&E)       | 0                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Manage for a diversity of habitat types and age classes for as many species as possible | 0                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Manage vegetation types which have commercial potential                                 | 0                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Manage habitat for T&E species  | 0                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 | 0                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Other (specify)   |                                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |                             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |
| Other (specify)   |                                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |                             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 10 |

40. Indicate the types of wildlife management practices that are used on your project and the target species for each. Since some practices may be applied by state (fish and wildlife or other) agencies, other federal agencies, or other government or private organizations, which group normally accomplishes these activities.

| Check<br>all that<br>apply | Management practice                             | Target<br>species | Organization<br>responsible<br>for practice |
|----------------------------|---|-------------------|---|
| <input type="checkbox"/>   | Fences and crossings                            |                   |   |
| <input type="checkbox"/>   | Brush piles                                     |                   |   |
| <input type="checkbox"/>   | Edge maintenance                                |                   |   |
| <input type="checkbox"/>   | Food plots or patches                           |                   |   |
| <input type="checkbox"/>   | Other food and cover plantings                  |                   |   |
| <input type="checkbox"/>   | Water developments (e.g., catchments, guzzlers) |                   |   |
| <input type="checkbox"/>   | Creation of forest openings                     |                   |   |
| <input type="checkbox"/>   | Prescribed burning                              |                   |   |
| <input type="checkbox"/>   | Supplemental feeding                            |                   |   |
| <input type="checkbox"/>   | Stocking  |                   |   |
| <input type="checkbox"/>   | Forest stand density manipulations              |                   |   |
| <input type="checkbox"/>   | Nesting and roosting structures                 |                   |   |
| <input type="checkbox"/>   | Pasture development                             |                   |   |
| <input type="checkbox"/>   | Crop specification for agricultural leases      |                   |   |
| <input type="checkbox"/>   | Corridor development                            |                   |   |
| <input type="checkbox"/>   | Snag management                                 |                   |   |
| <input type="checkbox"/>   | Other   |                   |   |

41. Identify animal control programs, species of concern, and extent of the problem on your project.

| Program or Practice                        | Target Species | Projected impact of the problem over the next 10 years |
|--|----------------|--|
| a. Predator control                        | _____          | decrease / same / increase                             |
| b. Management hunts to control populations | _____          | decrease / same / increase                             |
| c. Nuisance wildlife control               | _____          | decrease / same / increase                             |
| d. Control of feral dog/cats               | _____          | decrease / same / increase                             |

42. If hunting is allowed, list in order (most popular first) the 5 most popular terrestrial species that are hunted on your project. Also, rate the importance of your project as a provider of public hunting opportunity for this species in an area extending 50 miles (in any direction) around the project.

| Species  | Importance of Project as a provider of hunting opportunity<br>10=sole provider.....1=minor provider |   |   |   |   |   |   |   |   |   |
|----------|---|---|---|---|---|---|---|---|---|---|
| 1. _____ | 10  | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 2. _____ | 10  | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 3. _____ | 10  | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 4. _____ | 10  | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 5. _____ | 10  | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

43. Indicate if public hunting is managed at your project through any of the following methods.

| Practice                                    | Yes/No | Who manages the practice (check all that apply)<br>Corps State Other | Importance to achieving management objectives<br>(0=none, 1=low, 10=high) |
|---|--------|--|---|
| a. Closure of areas                         | _____  | _____  | 0 1 2 3 4 5 6 7 8 9 10  |
| b. Issuing permits                          | _____  | _____  | 0 1 2 3 4 5 6 7 8 9 10  |
| c. Limiting hunting numbers                 | _____  | _____  | 0 1 2 3 4 5 6 7 8 9 10  |
| d. Limiting means of hunting                | _____  | _____  | 0 1 2 3 4 5 6 7 8 9 10  |
| e. Special group hunts (e.g., parent/child) | _____  | _____  | 0 1 2 3 4 5 6 7 8 9 10  |
| f. Other                                    | _____  | _____  | 0 1 2 3 4 5 6 7 8 9 10  |

44. If there are any annual (or periodic) surveys that are intended to monitor the status of terrestrial plants or animals, itemize them in the following categories.

a. Habitat condition surveys (forage conditions, nest site availability, cover surveys, etc).

| Target<br>species<br>or group | Description of Survey | Frequency |                | Performing<br>organization |
|-------------------------------|-----------------------|-----------|----------------|----------------------------|
|                               |                       | Annual    | 2-5 yrs 5+ yrs |                            |
|                               |                       |           |                |                            |
|                               |                       |           |                |                            |
|                               |                       |           |                |                            |
|                               |                       |           |                |                            |
|                               |                       |           |                |                            |
|                               |                       |           |                |                            |

b. Population surveys: (bird censuses, road surveys, drive or flush surveys, roost counts, time/area counts, lodge counts, etc.)

| Species<br>or group | Description of Survey | Frequency |                | Performing<br>organization |
|---------------------|-----------------------|-----------|----------------|----------------------------|
|                     |                       | Annual    | 2-5 yrs 5+ yrs |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |

c. Recruitment surveys (nest counts, hatching success, brood surveys, den checks, etc.)

| Species<br>or group | Description of Survey | Frequency |                | Performing<br>organization |
|---------------------|-----------------------|-----------|----------------|----------------------------|
|                     |                       | Annual    | 2-5 yrs 5+ yrs |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |

d. Harvest surveys (check station, voluntary reporting system, mail survey, etc).

| Species<br>or group | Description of Survey | Frequency |                | Performing<br>organization |
|---------------------|-----------------------|-----------|----------------|----------------------------|
|                     |                       | Annual    | 2-5 yrs 5+ yrs |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |
|                     |                       |           |                |                            |

45. Do you use Habitat Suitability Indices (HSI) to determine habitat quality? Yes / No  
If yes, indicate for which species habitat quality has been determined and the method used (mark appropriate response and supply information as required).

| Species (list) | (✓ if applicable) |                   |                   |          | Other<br>(specify) |
|----------------|-------------------|-------------------|-------------------|----------|--------------------|
|                | USFWS<br>Bluebook | USFWS<br>Bluebook | Expert<br>Opinion | Modified |                    |
|                |                   |                   |                   |          |                    |
|                |                   |                   |                   |          |                    |
|                |                   |                   |                   |          |                    |

46. Do you make habitat quality evaluations for groups of species or for communities? Yes / No  
If yes, indicate which groups of species or communities and the source of the models you used.

| Groups of Species/Communities | Source of Model(s) |
|-------------------------------|--------------------|
|                               |                    |
|                               |                    |
|                               |                    |

47. Briefly describe any perceived needs by the project to restore, protect, or manage project terrestrial resources (including riparian zones) that are not part of your current management program.

|  |
|--|
|  |
|  |
|  |



### AQUATIC RESOURCES

48. Rate the importance (0=not important...5=moderately important...10=very important) of the following concerns in the management of aquatic resources on your project. Where you can, also rate the anticipated importance of these considerations in the next 10 years.

| Potential Management Concerns | Current Importance |   |   |   |   |   |   |   |   |   | Importance In Next 10 Years |   |   |   |   |   |   |   |   |   |   |    |
|-------------------------------|--------------------|---|---|---|---|---|---|---|---|---|-----------------------------|---|---|---|---|---|---|---|---|---|---|----|
| Water Quality                 | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Pollution/Contamination       | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Siltation/Sedimentation       | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Condition of Fishery          | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Shoreline Erosion             | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Nuisance Aquatic Plants       | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Boater Crowding               | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Aquatic User-group Conflicts  | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Specify other                 | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Specify other                 | 0                  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                          | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

49. Rate the extent to which project operations influence the following factors:

| (circle all that apply)     |   |            |   |   |   |   |   |   |   |    |    |                                    |  |  |  |  |  |  |  |  |
|-----------------------------|---|------------|---|---|---|---|---|---|---|----|----|------------------------------------|--|--|--|--|--|--|--|--|
| Factors                     |   | Importance |   |   |   |   |   |   |   |    |    | Area of concern                    |  |  |  |  |  |  |  |  |
| Seasonal water fluctuations | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Water Quality               | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Pollution/Contamination     | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Siltation/Sedimentation     | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Fishery Considerations      | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Shoreline Erosion           | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Resource Use Conflicts      | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 0 | 1          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10 | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Specify Other               | 1 | 2          | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |    | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 1 | 2          | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |    | upstream / on project / downstream |  |  |  |  |  |  |  |  |
| Specify Other               | 1 | 2          | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |    | upstream / on project / downstream |  |  |  |  |  |  |  |  |
|                             | 1 | 2          | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |    | upstream / on project / downstream |  |  |  |  |  |  |  |  |

(circle all that apply)

50. Describe any major requirements or restrictions on project operations intended to accommodate recreation or natural resources (e.g., minimum flow releases for anadromous fishes).

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51. What percentage of your aquatic area is infested with nuisance aquatic vegetation? \_\_\_\_\_

52. If nuisance aquatic plants or animals are present or expected, characterize their status on the project with the following information.

| Nuisance Species | Present coverage (%) | Year Introduced (approx.) | Coverage during last 10 years | Coverage expected during next 10 years |
|------------------|----------------------|---------------------------|-------------------------------|--|
|                  |                      |                           | decreasing/stable/increasing  | decreasing/stable/increasing           |
|                  |                      |                           | decreasing/stable/increasing  | decreasing/stable/increasing           |
|                  |                      |                           | decreasing/stable/increasing  | decreasing/stable/increasing           |

53. Identify any recognized conflicts among different uses (ex. hydropower operations vs fish recruitment) or user groups (ex. fisherman vs pleasure boaters) of the aquatic resources on the project.

| Conflicting uses or user groups | Severity |   |   |   |            |   |   |   |   |              | Trend                      |
|---------------------------------|----------|---|---|---|------------|---|---|---|---|--------------|----------------------------|
|                                 | 1=low    | 2 | 3 | 4 | 5=moderate | 6 | 7 | 8 | 9 | 10=very high |                            |
| _____                           | 1        | 2 | 3 | 4 | 5          | 6 | 7 | 8 | 9 | 10           | decreasing/same/increasing |
| _____                           | 1        | 2 | 3 | 4 | 5          | 6 | 7 | 8 | 9 | 10           | decreasing/same/increasing |
| _____                           | 1        | 2 | 3 | 4 | 5          | 6 | 7 | 8 | 9 | 10           | decreasing/same/increasing |
| _____                           | 1        | 2 | 3 | 4 | 5          | 6 | 7 | 8 | 9 | 10           | decreasing/same/increasing |

54. Have any public health-related advisories ever been issued by any local, state, or federal agency in regard to:

|                   |                   |                      |                        |
|-------------------|-------------------|----------------------|------------------------|
| Activity          | Ever been issued? | Currently in effect? | If yes, identify cause |
| Eating fish       | No / Yes          | No / Yes             |                        |
| Swimming          | No / Yes          | No / Yes             |                        |
| Other public uses | No / Yes          | No / Yes             |                        |

55. If a sport fishery is present on your project, please answer the following questions:

a. List (up to five) and rank the most important game fishes on your project and indicate the status of standing stocks of these fishes during the last 10 years and the anticipated status over the next 10 years.

| Species | Importance (Rank) | Size of Standing Stocks           |                                   |
|---------|-------------------|-----------------------------------|-----------------------------------|
|         |                   | Last 10 years                     | Next 10 years                     |
|         |                   | decrease/same/increase/don't know | decrease/same/increase/don't know |
|         |                   | decrease/same/increase/don't know | decrease/same/increase/don't know |
|         |                   | decrease/same/increase/don't know | decrease/same/increase/don't know |
|         |                   | decrease/same/increase/don't know | decrease/same/increase/don't know |
|         |                   | decrease/same/increase/don't know | decrease/same/increase/don't know |

b. Identify game and non-game fishes that have been stocked in project waters.

| Species | Frequency of stocking                 |
|---------|---------------------------------------|
|         | annually / every 2-4 years / 5+ years |
|         | annually / every 2-4 years / 5+ years |
|         | annually / every 2-4 years / 5+ years |
|         | annually / every 2-4 years / 5+ years |
|         | annually / every 2-4 years / 5+ years |

c. Identify any harvest or stock assessment surveys of fishes performed on the project:

| Type of Survey                           | Frequency of Surveys                        |
|--|---|
| — Creel Surveys                          | annually / 2-3 years / 4-6 years / 7+ years |
| — Rotenone Surveys                       | annually / 2-3 years / 4-6 years / 7+ years |
| — Electroschocking Surveys               | annually / 2-3 years / 4-6 years / 7+ years |
| — Gill Net Surveys                       | annually / 2-3 years / 4-6 years / 7+ years |
| — Other _____                            | annually / 2-3 years / 4-6 years / 7+ years |
| — No harvest or stock data are collected |   |

d. If creel surveys are performed on the project, indicate which of the following are computed from the information collected in these surveys.

|                                   |                                   |
|-----------------------------------|-----------------------------------|
| — fisherman catch per unit effort | — estimated fish harvest          |
| — fish length/weight statistics   | — fisherman attitudes or opinions |
| — trip expenditures               | — don't know                      |

e. Indicate if Corps (district or project) personnel or funds are utilized for any of the following fishery management activities:

| Description                                       | Activity not undertaken on project |                     | Corps    |            |
|---|------------------------------------|---------------------|----------|------------|
|   | on project                         | Responsible agency? | Funds?   | Personnel? |
| Collection of creel or stock assessment data      | _____                              | _____               | No / Yes | No / Yes   |
| Analysis of creel or stock assessment data        | _____                              | _____               | No / Yes | No / Yes   |
| Participation in stocking efforts                 | _____                              | _____               | No / Yes | No / Yes   |
| Management/control of nuisance aquatic vegetation | _____                              | _____               | No / Yes | No / Yes   |
| Other _____                                       | _____                              | _____               | No / Yes | No / Yes   |
| Other _____                                       | _____                              | _____               | No / Yes | No / Yes   |

56. Briefly describe any perceived needs to restore, protect, or manage aquatic resources that are not part of your current management program.

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**THREATENED AND ENDANGERED (T&E) SPECIES**

57. Have any inventories been conducted on the project to identify?

Federally listed Threatened and Endangered (T&E) species No / Yes  
 Potential preferred habitats for T&E species No / Yes

58. If any inventories for federally listed T&E species have been conducted on the project, answer the following:

a. Inventories for T&E species on the project were conducted by (check all that apply)?

Project personnel \_\_\_\_\_  
 Other COE elements: specify \_\_\_\_\_  
 U.S. Fish and Wildlife Service \_\_\_\_\_  
 National Marine Fisheries Service \_\_\_\_\_  
 State agency \_\_\_\_\_  
 College or University \_\_\_\_\_  
 The Nature Conservancy \_\_\_\_\_  
 Private Sector Contractor \_\_\_\_\_  
 Other: specify \_\_\_\_\_

b. Which of the following best characterizes T&E inventories that have been conducted on the project (circle number that best applies)?

- 1) Comprehensive, project-wide inventory for all known or probable T&E species that occur in the region
- 2) Thorough inventory for selected species known to occur on the project
- 3) cursory inventories only
- 4) Other (please specify) \_\_\_\_\_

c. Indicate which groups of T&E species have been surveyed and the extent of those surveys by circling the appropriate responses.

| Category                                       | Potential T&E species surveyed? | Extent of project area surveyed? | Were candidate species surveyed? |
|--|---------------------------------|----------------------------------|----------------------------------|
| Federally listed fishes                        | none / some / all               | none / partially / completely    | No / Yes                         |
| Federally listed birds                         | none / some / all               | none / partially / completely    | No / Yes                         |
| Federally listed mammals                       | none / some / all               | none / partially / completely    | No / Yes                         |
| Federally listed reptiles and amphibians       | none / some / all               | none / partially / completely    | No / Yes                         |
| Federally listed invertebrates                 | none / some / all               | none / partially / completely    | No / Yes                         |
| Federally listed plants                        | none / some / all               | none / partially / completely    | No / Yes                         |
| Critical habitats for federally listed species | none / some / all               | none / partially / completely    | No / Yes                         |
| State listed plants or animals                 | none / some / all               | none / partially / completely    | No / Yes                         |

d. Estimate the effort already expended and the effort that will be expended in the next 10 years toward final completion of inventories for federally listed T&E species.

|                      | Stage of completion (%) |    |    |    |    |    |    |    |    |    |     |
|----------------------|-------------------------|----|----|----|----|----|----|----|----|----|-----|
|                      | 0                       | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Present Time:        |                         |    |    |    |    |    |    |    |    |    |     |
| In another 10 years: | 0                       | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

59. If any federally listed T&E species have been found on the project, answer the following:

a. Identify the federally listed T&E species that have been found on the project.

| Species name | Taxonomic identify (circle one)                                   |
|--------------|---|
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |

b. Identify species found on the project that are proposed or candidate T&E species or those officially classified as at risk by the U.S. Fish and Wildlife Service.

| Species name | Taxonomic identify (circle one)                                   |
|--------------|---|
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |
|              | invertebrate / fish / amphibian / reptile / bird / mammal / plant |

60. Does your OMP address T&E species management concerns? Yes \_\_\_\_\_ No \_\_\_\_\_

61. Are any of the following available for T&E species identification, protection and management (check all that apply)?

- ☐ Current management plan for one or more T&E species
- ☐ Agreement with other agencies or organizations for management of T&E species or their habitats: identify agency(s) \_\_\_\_\_
- ☐ Access to formal training on T&E species
- ☐ Availability of reference materials on T&E species (e.g., copy of recovery plan, other)

62. Identify monitoring activities for T&E species found on the project by providing the following information.

| Species<br>write in | Type of<br>inventory<br>check | Typical<br>inventory<br>interval<br>in years<br>circle one | Year<br>last<br>performed? | Performing<br>organization(al) |
|---------------------|-------------------------------|--|----------------------------|--------------------------------|
| _____               | Population status             | 1 2-3 4+   | _____                      | _____                          |
| _____               | Habitat condition             | 1 2-3 4+   | _____                      | _____                          |
| _____               | Recruitment                   | 1 2-3 4+   | _____                      | _____                          |
| _____               | Population status             | 1 2-3 4+   | _____                      | _____                          |
| _____               | Habitat condition             | 1 2-3 4+   | _____                      | _____                          |
| _____               | Recruitment                   | 1 2-3 4+   | _____                      | _____                          |
| _____               | Population status             | 1 2-3 4+   | _____                      | _____                          |
| _____               | Habitat condition             | 1 2-3 4+   | _____                      | _____                          |
| _____               | Recruitment                   | 1 2-3 4+   | _____                      | _____                          |

63. Do you manage critical habitats (as defined by the U.S. Fish and Wildlife Service) for any T&E species?  
Yes \_\_\_\_\_ No \_\_\_\_\_. If yes, identify the species for which critical habitat are managed.



64. Indicate whether the presence of any T&E species substantially affects or is affected by any of the following (check all that apply):

| Activity                                | Species | Explain or Specify |
|---|---------|--------------------|
| — Visitor recreation                    |         |                    |
| — Project operations                    |         |                    |
| — Management of other natural resources |         |                    |
| — Other                                 |         |                    |

65. Do land use activities on private or public lands bordering the project adversely affect your ability to protect or manage T&E species on the project (circle one)? No / Yes

If yes, identify species and describe conditions adversely affecting protection and/or management of T&E species on the project.

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66. Approximately what percentage of T&E management activities are conducted in off-project areas? \_\_\_\_\_  
What is the nature of these activities? (briefly describe)

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67. In the past 5 years, approximately how many times have you requested informal consultation with the U.S. Fish and Wildlife Service or National Marine Fisheries Service regarding federally listed T&E species (circle one)?

never / 1 time / 2 times / 3-5 times / 6-10 times / 11+ times

If you indicated 1 or more informal consultations, which of the following characterize the nature of the consultation(s) (check all that apply):

- ☐ request for project visit and assistance with identification of species
- ☐ request for a screening list of T&E species on the project
- ☐ request for background information on T&E life history or habitat requirements
- ☐ request for assistance in surveying or developing inventories or surveys for T&E species
- ☐ request for assistance in formulating T&E management objectives or plans
- ☐ request informal opinion of possible project action
- ☐ other

68. Has a formal Section 7 consultation ever taken place in regard to a proposed project action potentially affecting a federally listed T&E species (circle one)?

No / Yes

a. If yes, provide the following information for each occurrence of a formal section 7 consultation include additional pages, if necessary:

| Year initiated | Year (if) resolved | Species of concern | Jeopardy opinion? | Project action requiring consultation | Outcome (circle one)        |   |                          |   |
|----------------|--------------------|--------------------|-------------------|---------------------------------------|-----------------------------|---|--------------------------|---|
|                |                    |                    | No/Yes            |                                       | unresolved; opinion pending | disagreed with opinion; action unresolved | withdrew proposed action | modified proposed project action to eliminate concern |
|                |                    |                    | No/Yes            |                                       | unresolved; opinion pending | disagreed with opinion; action unresolved | withdrew proposed action | modified proposed project action to eliminate concern |
|                |                    |                    |                   |                                       |                             |   |                          | mitigated effects and proceeded with proposed action  |
|                |                    |                    |                   |                                       |                             |   |                          | mitigated effects and proceeded with proposed action  |

69. If your project has natural resource outgrants, answer the following.

a. Does the lease agreement(s) specify T&E species protection and management responsibilities on the outgrant(s)?

Yes / No

b. Who most directly oversees the following T&E activities on lease holdings?

| Activity   | Activity Occurs |            | Who is Responsible for Activity? |                          |
|--|-----------------|------------|----------------------------------|--------------------------|
|  | On Outgrants    |            | Project                          | Lessee Shared Don't Know |
| Species inventories or surveys                     | Yes / No        | Don't Know | —                                | —                        |
| Population/habitat monitoring                      | Yes / No        | Don't Know | —                                | —                        |
| Implementing T&E species protection and management | Yes / No        | Don't Know | —                                | —                        |

70. Briefly describe any perceived needs to restore, protect, or manage project Threatened and Endangered species resources that are not part of your current management program.

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### WETLAND RESOURCES

71. Provide a gross estimate of the number of acres of natural and constructed wetlands on your project.  
Naturally occurring wetlands \_\_\_\_\_ acres      Constructed wetlands \_\_\_\_\_ acres
72. Has a wetland inventory been conducted for project lands? (circle) Yes / No (if no, go to question 76)
73. Which of the following best categorizes your wetlands inventory? (circle letter)  
a. Comprehensive inventory of all project wetlands  
b. Thorough inventory of selected high priority wetlands  
c. cursory inventory of general wetland types  
d. Other (describe) \_\_\_\_\_
74. Estimate the degree of completion of your wetland inventory. (circle)
- |                     | Stage of Completion (%) |    |    |    |    |    |    |    |    |    |     |
|---------------------|-------------------------|----|----|----|----|----|----|----|----|----|-----|
|                     | 0                       | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Present time:       | 0                       | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| In another 5 years: | 0                       | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
75. What method was used to inventory and classify wetlands on your project? (circle letter)  
a. USAE Corps of Engineers Wetland Delineation Manual (commonly called the "'87 Manual")  
b. National Wetland Inventory System, e.g., Cowardin et al. (1992) method  
c. Wetland Classification System of Shaw and Fredine (1956)  
d. General estimate from project data and/or maps  
e. Other (describe): \_\_\_\_\_
76. Who was responsible for conducting the wetland inventory? (circle letter and supply appropriate information).
- |                                 | Was delineator<br>Certified? (circle) |            |
|---------------------------------|---------------------------------------|------------|
|                                 | Yes / No                              | Don't know |
| a. Project personnel . . . . .  | Yes / No                              | Don't know |
| b. District personnel . . . . . | Yes / No                              | Don't know |
| c. WES personnel . . . . .      | Yes / No                              | Don't know |
| d. USFWS . . . . .              | Yes / No                              | Don't know |
| e. State agency (specify) _____ | Yes / No                              | Don't know |
| f. Other (specify) _____        | Yes / No                              | Don't know |

77. If wetlands on your project have been identified and mapped using any procedures, please list the wetland types and acreage of each.

| Wetland type | Acreage |
|--------------|---------|
| _____        | _____   |
| _____        | _____   |
| _____        | _____   |
| _____        | _____   |
| _____        | _____   |
| _____        | _____   |

78. Rate (0=none, 1=low, and 10=high) the importance of the following objectives in management of your project's wetland resources:

|   | Rate for the present time |   |   |   |   |   |   |   |   |   | Rate for the next 10 years |   |   |   |   |   |   |   |   |   |   |    |
|---|---------------------------|---|---|---|---|---|---|---|---|---|----------------------------|---|---|---|---|---|---|---|---|---|---|----|
| a. Waterfowl                                | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| b. Furbearer habitat                        | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| c. T&E species                              | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| d. Other non-game species                   | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| e. Wetland biodiversity                     | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| f. Wastewater treatment                     | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| g. Buffer zone management for aquatic areas | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| h. Vector control                           | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| i. Fish spawning                            | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| j. Other (specify) _____                    | 0                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10                         | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

79. List the species and associated wetland types most often featured in your wetland management programs (e.g., wood ducks/beaver ponds).

| Species | Wetland Type | Habitat Importance (check all that apply)<br>Breeding Migratory Wintering |
|---------|--------------|---|
| _____   | _____        | _____   |
| _____   | _____        | _____   |
| _____   | _____        | _____   |
| _____   | _____        | _____   |
| _____   | _____        | _____   |

80. Indicate the importance of the following wetland management practices on the project

| Practices                                    | Importance<br>0=none, 1=low, 10=high | Species for which practices<br>are designed to benefit |
|--|--------------------------------------|--|
| Beaver pond management                       | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Moist soil management                        | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Greentree reservoir operation                | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Artificial potholes                          | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Agricultural food plots                      | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Vegetation establishment<br>and manipulation | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Nesting structures                           | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Prescribed burning                           | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Reservoir water level manipulation           | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Buffer zone establishment                    | 0 1 2 3 4 5 6 7 8 9 10               | _____  |
| Other _____                                  | 0 1 2 3 4 5 6 7 8 9 10               | _____  |

81. What percentage of your wetland area is infested with nuisance vegetation? \_\_\_\_\_

82. If nuisance wetland plants or animals are present or expected, characterize their status on the project with the following information.

| Nuisance<br>Species | Present<br>coverage<br>(%) | Year<br>Introduced<br>(approx.) | Coverage                     |                                  |
|---------------------|----------------------------|---------------------------------|------------------------------|----------------------------------|
|                     |                            |                                 | during last 10 years         | expected<br>during next 10 years |
|                     |                            |                                 | decreasing/stable/increasing | decreasing/stable/increasing     |
|                     |                            |                                 | decreasing/stable/increasing | decreasing/stable/increasing     |
|                     |                            |                                 | decreasing/stable/increasing | decreasing/stable/increasing     |

83. Identify changes in the use of lands adjacent to your project and describe how these changes are affecting (positively or negatively) your ability to manage project wetlands.

| Nature of<br>Change | Extent                 |   |   |   |   |   |   |   |   |    | Effect on Project Wetlands |
|---------------------|------------------------|---|---|---|---|---|---|---|---|----|----------------------------|
|                     | 1=minor...10=extensive |   |   |   |   |   |   |   |   |    |                            |
|                     | 1                      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |                            |
|                     |                        |   |   |   |   |   |   |   |   |    |                            |
|                     | 1                      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |                            |
|                     |                        |   |   |   |   |   |   |   |   |    |                            |
|                     | 1                      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |                            |
|                     |                        |   |   |   |   |   |   |   |   |    |                            |

84. Briefly describe any perceived needs to restore, protect, or manage project wetlands that are not part of your current management program.

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### CULTURAL RESOURCES

Cultural resources management includes the responsibility for the stewardship of historic, archaeological, and paleontological resources on CE project lands.

85. Approximately what percent of your project lands have been surveyed and inventoried for cultural resources?  
\_\_\_\_\_ %

86. Has a historic preservation plan been prepared for your project? (circle one) Yes / No

87. How many cultural sites have been identified on your project? \_\_\_\_\_

88. How many sites have been listed on the Federal Register? \_\_\_\_\_

89. How many cultural resource sites on your project have been formally evaluated for significance? (circle one)

0    1-10    11-25    26-50    51-75    76-100    over 100

90. Who conducted site evaluations on your project? (check all that apply)

- contract archaeologists
- in-house archaeologists
- State Historic
- Preservation Officer
- Others (identify) \_\_\_\_\_



91. Indicate your assessment of the relative importance of the following cultural resource management objectives on your project. (circle the appropriate number representing the level of importance, circle 0 if the item is not an objective).

| Objective  | Importance at Present Time |   |   |   |   |   |   |   |   |    |      | Importance next 10 years |   |   |   |   |   |   |   |   |    |      |
|--|----------------------------|---|---|---|---|---|---|---|---|----|------|--------------------------|---|---|---|---|---|---|---|---|----|------|
|  | Low                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | High | Low                      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | High |
| Identification and description of cultural resource sites        | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Evaluation of the significance of sites                          | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Assessment of the impact of earth disturbing activities on sites | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Avoidance of impacts to sites                                    | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Site preservation and protection                                 | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Mitigation of adverse impacts on sites                           | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Native American consultation                                     | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Cultural resource repatriation                                   | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Public interpretation  | 0                          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   | 0                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  | 10   |
| Other:   |                            |   |   |   |   |   |   |   |   |    |      |                          |   |   |   |   |   |   |   |   |    |      |
|  | 1                          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |      | 1                        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |      |
|  | 1                          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |      | 1                        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |      |
|  | 1                          | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |      | 1                        | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |      |

92. Identify the cultural resource site protection and preservation practices utilized on your project in the past ten years (check all that apply).

| Utilized in<br>past 10 years | Practice   |
|------------------------------|--|
| <input type="checkbox"/>     | structural stabilization (i.e., engineering materials) |
| <input type="checkbox"/>     | stabilization with natural materials                   |
| <input type="checkbox"/>     | erosion control in upland areas                        |
| <input type="checkbox"/>     | signing (interpretative and warning)                   |
| <input type="checkbox"/>     | fencing  |
| <input type="checkbox"/>     | monitoring (e.g. periodic site visits)                 |
| <input type="checkbox"/>     | surveillance (e.g. electronic devices)                 |
| <input type="checkbox"/>     | site burial  |
| <input type="checkbox"/>     | other: (identify) _____                                |

93. Are there any cultural resource issues that have affected your ability to manage other natural resources.  
 Yes\_\_\_\_ No\_\_\_\_. If yes, briefly describe the conflict.

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94. Briefly describe any perceived needs to protect or manage cultural resources that are not a part of your current management program.

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# REPORT DOCUMENTATION PAGE

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| <b>13. ABSTRACT (Maximum 200 words)</b><br><br>Natural resources management on U.S. Army Corps of Engineers water resources development projects was documented from the responses of management personnel to a detailed questionnaire mailed to a stratified random sample of projects. The survey was sent in January 1996 to 66 Corps projects (19 percent of the sampling frame) selected at random within 10 Corps Divisions located in the contiguous United States. Results were based on 62 completed questionnaires returned through August 1996, an overall response rate of approximately 94 percent.<br><br>Corps projects reported spending an average of 6.6 percent (0-29 percent) of their project budget on natural resources management activities associated with terrestrial (50 percent of natural resources budget), aquatic (27 percent), and wetland (12 percent) resources and threatened and endangered species (12 percent). Natural resources management programs were highly individualized because of project-specific differences in the type and condition of available resources; the availability of funding, personnel, and management partners; and the local physical and cultural environment surrounding each project. Management efforts were typically directed at a broad range of resource uses including outdoor recreation, fish, wildlife, timber, and agriculture. A large share of the natural resources management effort was usually associated with outdoor recreation, particularly fishing and hunting recreation.<br><br>(Continued) |   |  |  |  |
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**13. (Concluded).**

Contributions of management partners strongly influenced natural resources management on Corps projects. Most influential were state fish and wildlife agencies, which participated in some aspect of natural resource management on almost all Corps projects. State agencies typically managed most aspects of the recreational fishery on Corps projects. They also managed most of the natural resource outgrants on Corps projects where game management and hunter recreation were the primary management objectives.

Corps projects indicated a commitment to maintaining the recreational aspects of their natural resources management programs. However, they also indicated a need for, and anticipated expansion of, stewardship activities along a broad front. Completion of resource inventories, expansion of threatened and endangered species efforts, and increased management of nongame wildlife were among the stewardship activities that projects hoped to expand. They also recognized management challenges associated with increased development and other land-use changes occurring along project boundaries. Projects expected to expand management efforts and meet emerging challenges by expanding the natural resource management efforts of project staff and by enlarging the role of non-Corps partners in natural resource management activities.

**14. (Concluded).**

|                           |                                     |                                   |
|---------------------------|-------------------------------------|-----------------------------------|
| Aquatic resources         | Management issues                   | Threatened and endangered species |
| Fisheries                 | Management objectives and practices | Trends                            |
| Game and nongame wildlife | Natural resources                   | Wetlands                          |
| Mail survey               |                                     |                                   |